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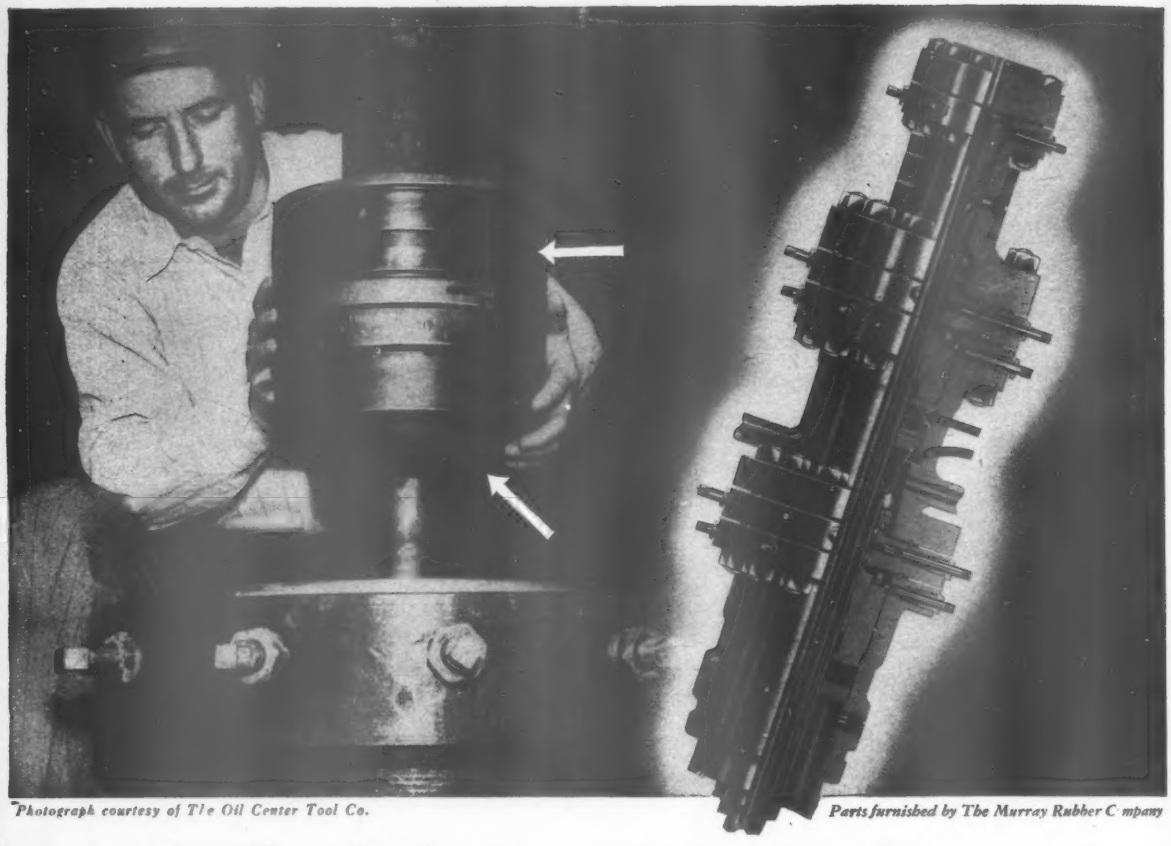

Photograph courtesy of The Oil Center Tool Co. *Parts furnished by The Murray Rubber Company*

Hycar Handles Multi-Zone Casing Head Separations

ONE problem in Multi-zone well production separation is in the casing head where the resilient packing material has a difficult and tricky job to do. For example, recently in several wells in one Gulf Coast field the packing material had to separate dry gas under 3800 lbs. pressure p.s.i. and high gravity distillate flowing under 3000 lbs. pressure p.s.i. To handle this difficult situation Hycar was selected by The Oil Center Tool Company for use in its "C-9-D" Casing Head. The upper arrows in the illustration point to two hinged rings of Hycar resilient packing, while the lower arrows show the Hycar stripper type packoff. Both types are constantly exposed to oil and/or gas upon the completion of a well.

Hycar was selected for this job because of its established superiority in resistance to petroleum products. Hycar is a well-known name in oil fields where its petroleum and acid-resistance, its abrasion-resistance and its high tensile strength have made it the ideal material for gate packers in mud line valves, oil well tubing packers, coal rings, packing for well heads, gaskets and many other products where these properties are vital.

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Trends

Crude-Oil Production By States—Page 128

CRUDE-OIL STOCKS 223,482,000 bbl. as of September 2—up 551,000 bbl. One year ago 234,635,000 bbl.

GASOLINE STOCKS 79,921,000 bbl. as of September 2—down 819,000 bbl. One year ago 70,552,000 bbl.

RESIDUAL FUEL-OIL STOCKS 59,876,000 bbl. as of September 2—up 537,000 bbl. One year ago 67,152,000 bbl.

GAS OIL AND DISTILLATE STOCKS 41,964,000 bbl. as of September 2—up 421,000 bbl. One year ago 37,274,000 bbl.

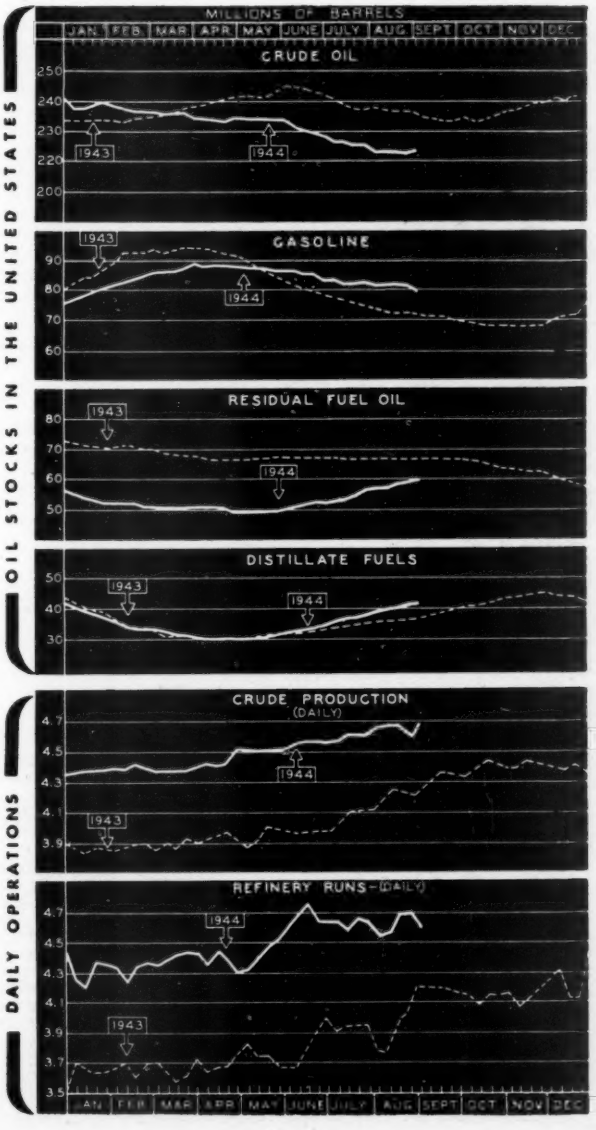
CRUDE-OIL PRODUCTION 4,696,800 bbl. as of September 9—up 48,000 bbl. One year ago 4,339,615 bbl.

REFINERY RUNS 4,592,000 bbl. daily week ended September 2—down 106,000 bbl. Year ago 4,245,000 bbl.

AS predicted in the projection of operations by The Oil and Gas Journal at the end of the first 6 months of 1944, there was an increase in drilling operations in this country during July and August and so far in September. Completions for the 10-week period starting July 1 were at a rate in excess of 25,000 yearly, in contrast with the 23,000 rate for the half year. As shown in the weekly chart covering drilling operations on page 127 of this issue, the trend in completions has been consistently upward since early April. Should this continue, drilling operations at the close of the year will be close to 600 weekly or 30,000 yearly. Several reasons are advanced for this expansion in field operations, the most important of which is the desire of operators to give full support to the war program, which continues to necessitate month-to-month increases in domestic crude-oil output.

KEEPING in mind that the expansion in drilling in recent weeks is partly seasonal, the increases are surprisingly general. Compared with an average 10-week period of the first 6 months of this year, drilling east of the Mississippi from July 1 to September 9 was 15 to 25 per cent greater. The subsidy for stripper wells, effective in Pennsylvania and other eastern and middle-western areas, is apparently a factor in the completion of more wells. The percentage increase in the Mid-Continent and Texas is less than in the Middle West and East, but all the important oil states of the Southwest show increases. The percentage gain in Mississippi, due to the discovery of new fields and the exploration activity, is particularly noteworthy over the past 2 months.

IN exploration more wells are being completed than was the case the first half of the year, and there is a greater percentage of successful operations. The weekly reports on wildcat completions from July 1 to September 9 point to an increase in operations in excess of 20 per cent when compared with the average weekly operations the first half of the year. While a 10-week period is too short for final conclusions as to the success of increased wildcatting, the percentage of producers so far is running substantially ahead of the first 6 months. Reports for July and August show 759 completions, of which 92 were oil wells, 4 distillate wells, 21 gas wells and 642 dry holes.



Swift Return Expected in Rate Of Oil-Demand Increase

Demand Likely to Exceed War-Inflated Requirements During and After 1947

NEW YORK.—A comparatively swift return to the normal rising trend in the demand for crude oil and products is expected after the war. According to E. T. Knight, economist, Atlantic Refining Co., who bases his predictions on the war with Germany ending this year and that with Japan in 1945, demand for petroleum and its products will decline slightly in 1945 and 1946 but will resume its upward trend in 1947 and by 1950 will be more than 20 per cent above 1941.

These predictions are summarized in detail in the accompanying table and graph which cover the years from 1933 to 1950, inclusive. These show actual prewar requirements and his estimates of postwar demands for crude oil and products, both domestic and export.* Data for 1942, 1943 and 1944 are excluded due to military restrictions.

Actual domestic and export demand for the principal petroleum products in 1941 and anticipated total demand for these products in 1950 are given in the following table (thousands of barrels):

Product—	1941	1950	Change
Gasoline	694,588	846,400	+151,812
Kerosene	72,690	63,220	— 9,470
Gas oil, dist.	189,749	257,410	+ 67,661
Res. fuel oil	397,536	476,620	+ 79,084
Lubes	41,333	41,990	+ 657
Wax	2,631	2,460	— 171
Misc.*	163,312	207,960	+ 44,648
Total	1,561,830	1,896,000	+334,221

As might be expected and as is apparent from the above tabulation, the major portion of the increase in demand will be in motor fuel. It will in 1950, as it did in 1941, represent almost 45 per cent of the total demand for all petroleum products.

In spite of the certain expansion in private and commercial flying, demand for aviation gasoline is not expected to represent a large proportion of the total motor-fuel demand until some time after 1950. Aviation demand in that year is predicted to total 143,000 bbl. per day, of which 56 per cent will be consumed in commercial flying, 35 per cent in military operations and 9 per cent in private flying. Almost three-quarters will be 100-octane and the remainder 90 octane. The estimate of aviation requirements in 1950 follow (barrels per day):

		Type	
Consumer—	Total	100 octane	90 octane
Commercial:			
(domestic)	68,000	68,000	.....
(internat'l)	12,700	12,700	.....
Private	13,200	.....	13,200
Military	50,000	25,000	25,200
Total	143,900	105,700	38,200

The largest gain in aviation demand is expected in commercial operations. This expectation is based largely on the fact that the 16.5 per cent rate reduction in 1933 to 1941 was accompanied by an increase of 725 per cent in passenger travel and that a further reduction of 40 per cent is possible. It is assumed that there will be five times as many private planes in operation in 1950 as in 1941 but such a fleet, 150,000 planes, would consume only an estimated 13,200 bbl. per day, less than 1 per cent of total gasoline demand. Aviation motor-oil requirements are expected to amount to 3,000 bbl. per day in 1950.

Domestic demand for motor fuel of lower than aviation grade is expected to reach 781,370,000 bbl. annually at the end of this period. Exports are expected to decline to 12,500,000 bbl. and, with aviation requirements of 52,530,000 bbl., the total demand for domestically produced gasoline will mount to 833,900,000 bbl. Of this total 509,700,000 bbl. will be required for passenger cars which, therefore, would account for 60 per cent of the entire demand. The importance of passenger cars to the oil industry and the industry's stake in the speedy resumption of their production is readily apparent.

Estimate of domestic gasoline demand, excluding aviation, compared to actual requirements in 1941 follows (thousands of barrels):

Consumer—	1941	1950
Passenger cars	436,599	509,700
Trucks	145,386	165,300
Agricultural*	30,594	46,370
Industrial†	43,524	60,000
Total	656,103	781,370

*Nonautomobile. †Including nonhighway.

Passenger-car consumption in 1946, it is predicted, will fall to

SUMMARY OF PASSENGER-CAR PICTURE

Year—	Average registration 1,000's	Motor oil consumption 1,000 bbl.	Units consumption bbl.	Total unit mileage
1933	20,765	258,782	12.5	7,875
1935	22,039	293,331	13.3	8,385
1937	24,813	349,068	14.1	8,880
1939	25,732	364,602	14.2	8,955
1941	28,471	436,599	15.3	9,650
1943	26,062	222,862	8.6	5,420
1945	22,500	267,750	11.9	7,500
1947	26,400	393,350	14.9	9,650
1949	32,800	465,750	14.2	9,750
1950	36,150	509,700	14.1	10,000

PAST AND FUTURE DEMAND FOR DOMESTIC PETROLEUM

Domestic consumption (1,000 bbl.)

	Motor fuel	Kerosene	Gas oil and distillates	Residual fuel	Lubricants	Wax	Miscellaneous inc. losses	Total	Exports* crude and products
1933	377,003	38,493	.....	316,344	18,052	1,263	117,601	868,756	106,727
1934	410,339	44,234	74,720	255,651	19,503	857	105,150	920,454	114,507
1935	434,810	47,645	86,028	280,695	20,678	933	113,204	983,993	128,897
1936	481,606	51,428	102,757	307,884	23,370	1,077	124,981	1,093,103	131,994
1937	519,352	54,972	116,841	325,514	24,399	1,062	127,906	1,170,046	172,834
1938	523,003	56,360	117,449	291,833	22,220	995	125,595	1,137,455	193,728
1939	555,509	60,503	134,973	323,488	24,813	1,162	130,999	1,231,447	188,959
1940	589,490	68,776	160,851	340,163	25,757	1,275	140,694	1,327,006	130,466
1941	667,505	69,469	172,824	383,422	31,409	1,871	159,752	1,486,252	108,830
1945	585,350	72,700	181,820	424,730	27,430	1,720	158,720	1,432,470	150,000
1946	561,400	67,800	208,370	441,490	29,520	1,810	163,240	1,473,630	102,900
1947	677,880	65,780	220,740	460,670	32,280	1,840	181,970	1,641,160	79,950
1948	690,510	62,360	232,140	435,430	28,940	1,500	181,300	1,632,180	62,500
1949	758,190	62,560	241,200	460,950	30,760	1,400	194,560	1,749,620	54,300
1950	833,900	62,620	255,410	474,020	33,090	1,820	207,500	1,868,960	46,900

*Export data are from A.I.M.E. report of C. L. Burrill, Standard Oil Co. (New Jersey).

301,150,000 bbl., off 31 per cent from the all-time high of 1941, However, the trend toward greater consumption per vehicle is expected to be resumed in 1947. Accordingly in 1949 passenger-car consumption will be ahead of 1941 and in 1950 will be almost 17 per cent above the present high.

With respect to the all-important passenger-car factor, the forecast assumes "that by 1945 a sizable part of the nation's automotive productive facilities will be producing units for domestic consumption. (Acting War Production Board Chairman Krug said recently that production would begin within 3 months after Germany's defeat.) A production of 3,200,000 passenger units is expected. Thereafter as more productive facilities are converted from the war effort, the output of equipment will increase rapidly until 6,500,000 units are made available in 1950.

"The records indicate that from 1933 to 1941 with the exception of 1938 the average annual miles of passenger-car operation increased steadily. This forecast considers that by 1947 this trend will have been reestablished and an average annual operation of 10,000 miles is expected by 1950.

"It is expected that mileage per gallon of fuel consumed may increase as more power and efficient engines are developed, but it is assumed that some gain in mileage per gallon to be expected from the improved engine will be counterbalanced by increases in speed of travel, and increases in efficiencies of new cars will be offset by the decrease in efficiency of older operating units.

"The forecast of mileage per gallon of consumption, here presented, considers the relationships of old and new cars to the total registration. It is expected that the new cars made available during 1945 and 1946 will be more efficient than the average of current registration. The units produced thereafter will be relatively more efficient and the 1950 new cars will be capable of providing 20 miles of average driving per gallon of consumption."

Consumption by trucks is not expected to grow proportionately as much as that of passenger cars because of more economic operation which is anticipated in the later years covered by this study. Though there will be, according to this estimate, more than 5,500,000 trucks in operation by 1950, the mileage per unit will be greater and the consumption per mile will be less. A huge increase is expected in agricultural consumption due mainly to the steady increase in the number of tractors which rose from 1 to 6.2 farms in 1933 to 1 to 3.7 farms in 1940. Even if the average annual increase is somewhat less than in those years, tractor density may increase to 1 to 2 farms. Accordingly, an increase of more than 50 per cent is anticipated in this category. The expected increase in industrial consumption is based on assumed parallel with business indices.

While the consumption of lubricants is expected to increase only slightly, from a total of 41,333,000 bbl. in 1941 to 41,990,000 bbl. in 1950, including exports, a substantial rise in the demand for motor oil is envisioned for this period. A 21.1 per cent gain in domestic motor-oil demand is expected which will be offset by declines in industrial oils and exports so that the total lubricant demand is expected to be only 1.6 per cent greater in 1950 than in 1941. A summary of actual domestic demand in 1941 and estimated demand 9 years later follows (thousands of barrels):

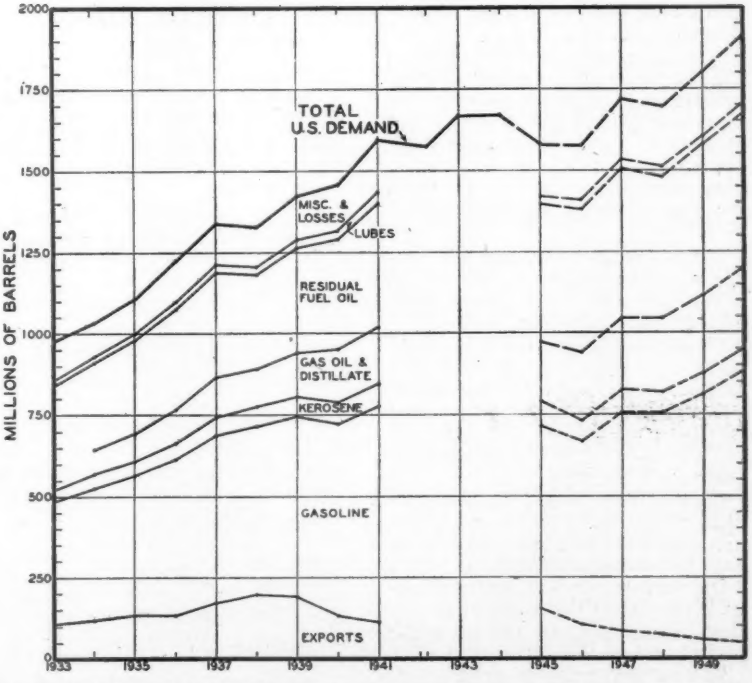
Type—	1941	1950
Automotive	14,844	17,170
Aviation	238	1,100
Industrial	16,327	14,820
Total	31,409	33,090

Kerosene demand is expected to decline due primarily to the supplanting of space heaters, range oil burners, water heaters, etc., by gas or electric units and secondarily to a reduction in exports. Consumption of kerosene as range oil accounted for 60 per cent of the demand in 1941, or 41,661,000 bbl. of a total of 69,469,000 bbl. Range-oil consumption in 1950 is expected to drop to 32,160,000 bbl., almost 30 per cent less than in 1941.

Consumption of gas oil and distillates is expected to show a sharp rise in the period covered by this survey. Normally more than 80 per cent of such oils are consumed as light heating oil. There has been a steady increase in the number of domestic heating units consuming this type of oil and this trend, it is believed, will continue after the war and the percentage of dwellings so equipped, which rose from 2.97 in 1933 to 6.74 in 1941, is expected to rise to 9.2 in 1950. This development would account for 90 per cent of the anticipated increase in consumption of gas oil and distillates. Diesel-fuel demand, particularly in the railroad field, is expected to grow markedly.

Demand for residual fuel oil is expected to be higher immediately after the war than it was in 1941 and to continue to grow in relation to general business conditions as it has in the past. Consumption by virtually all classes of consumers is expected to grow particularly in the fields of commercial heating and Navy fuel. It is anticipated that domestic consumption will rise from 383,422,000 bbl. in 1941 to 474,620,000 bbl. in 1950, an increase of almost 24 per cent.

A summary of these estimates, which were prepared in exhaustive detail but briefed in the shortest possible manner here, indicates that the industry faces no extreme adjustment problem in the immediate postwar era.



Anticipated demand for petroleum during the next 6 years, rising to a level in 1950 which would exceed 1941 requirements by 20 per cent

Outlook Bright for Keeping Oil's Place In Rubber Production

WASHINGTON. — Ability to produce butadiene for about one-fifth the cost of the only other commercial process indicates that the butylene - dehydrogenation method of manufacturing the chief component of synthetic rubber from petroleum hydrocarbons will continue as a major source of supply in the postwar period. This conclusion is drawn from the latest report on the synthetic-rubber program and is based on cost figures submitted by Rubber Reserve Co. as supervisor of the government-owned plants.

A stronger competitive position may be occupied by the alcohol process if, in the postwar period, sufficient alcohol can be obtained synthetically from petroleum or from molasses or other low-cost agricultural products. The butylene-dehydrogenation and alcohol processes would become competitive, the report states, if the prices of alcohol and butylene were approximately 9.5 and 6 cents per gallon, respectively, or 15 and 13.5 cents, respectively.

"These prices for alcohol, it is pointed out," are somewhat less than are generally estimated for the postwar market and on the basis of current calculations it appears that the butylene and butane dehydrogenation plants will be the low-cost producers.

"However, an improvement in the Carbide & Carbon Chemical Corp. process resulting in a higher yield of butadiene from a given quantity of alcohol or recovery of certain by-products which . . . are credited at fuel value would make the picture for alcohol butadiene more favorable."

Buna-S rubber can now be produced for an out-of-pocket cost of about 12.2 cents per pound with styrene and butadiene at 7 and 8 cents per pound, respectively, based on the low-cost butylene dehydrogenation and the Dow Chemical Co. styrene processes. The out-of-pocket cost for buna-S is approximately 37 cents per pound, if the butadiene is made from alcohol.

On a postwar basis it has been indicated that it should be possible to produce butadiene and styrene at out-of-pocket costs of not more than 7 and 5 cents per pound, respectively. These prices should make it possible to produce buna-S at an out-of-pocket cost of 10.7 cents per pound.

The synthetic-rubber program as finally evolved compared with recommendations of the Baruch committee is summarized in Table 1. These data show the dominating position of buna-S which is manufactured from butadiene and styrene as the chief components.

Plants operated by the oil industry and relying on petroleum hydrocarbons as the raw material for production of butadiene and butyl rubber are listed in Table 2.

TABLE 1—COMPARISON OF PRESENT RUBBER PROGRAM WITH BARUCH COMMITTEE RECOMMENDATIONS

A. Synthetic Rubber (Long Tons)

	Rated annual capacities			Estimated ultimate annual capacity with present plants, U.S. and Canada	Estimated annual rate 4th quarter 1944, U.S. and Canada
	Baruch U.S. only	Present U.S. only	Present U.S. and Canada		
1. Buna-S	845,000	705,000	735,000	1,000,000	780,000
2. Butyl	132,000	68,000	75,000	75,000	38,000
3. Neoprene-GN	69,000	*63,000	*63,000	70,000	57,000
4. Thiokol-N	60,000		Program suspended		
Total	1,106,000	836,000	873,000	1,145,000	875,000

*Including 14,000 additional tons of neoprene plant capacity scheduled for completion during 1944.

B. Butadiene (Short Tons)

	Rated annual capacities		
	Baruch U.S. only	Present U.S. only	Present U.S. and Canada
1. From grain or alcohol	247,000	230,000	230,000
2. From butane	60,000	75,000	75,000
3. From butylene	250,000	250,000	280,000
4. From naphtha	125,000	37,600	37,600
5. From combination of 3 and 4	85,000	55,000	55,000
6. From natural gas by Aldol		10,000	10,000
Total	767,000	657,600	687,600

TABLE 2—PETROLEUM BUTADIENE PLANTS

Operator and location—	Rated capacity, tons per year	Estimated Investment cost
From butylene:		
Standard Oil Co. of Louisiana, Baton Rouge, La.	15,000	8,600,000
Humble Oil & Refining Co., Baytown, Tex.	30,000	19,400,000
Cities Service Refining Corp., Lake Charles, La.	55,000	17,000,000
Neches Butane Products Co., Port Neches, Tex.	100,000	58,586,196
Sinclair Rubber Co., Houston, Tex.	50,000	31,500,000
Subtotal	250,000	135,186,196
From naphtha and gas oil:		
Standard Oil Co. of Louisiana, Baton Rouge, La.	6,800	2,000,000
Humble Oil & Refining Co., Ingleside, Tex.	7,000	4,100,000
Lion Oil Refining Co., El Dorado, Ark.	6,700	2,300,000
Taylor Refining Co., Corpus Christi, Tex.	5,500	1,800,000
Subtotal	26,000	10,200,000
Combination from naphtha and butylene:		
Southern California Gas Co., Los Angeles, Calif.	30,000	13,500,000
Shell Chemical Division, Los Angeles, Calif.	25,000	21,000,000
Subtotal	55,000	34,500,000
From butane:		
Phillips Petroleum Co., Borger, Tex.	45,000	35,000,000
Standard Oil Co. of California, El Segundo, Calif.	15,000	7,700,000
Sun Oil Co., Toledo, Ohio	15,000	7,500,000
Subtotal	75,000	50,200,000
Privately built plants:		
Standard Oil Co. of Louisiana, Baton Rouge, La.	*6,600	
Imperial Oil, Ltd., Sarnia, Canada	*30,000	
Subtotal	*36,600	
Butyl:		
Standard Oil Co. of Louisiana, Baton Rouge, La.	38,000	27,000,000
Humble Oil & Refining Co., Baytown, Tex.	30,000	26,000,000
Imperial Oil, Ltd., Sarnia, Canada	*7,000	
Subtotal	75,000	53,000,000
Grand total, government-owned plants	474,000	248,586,196

*Excluded from grand total.

THIS WEEK

REFINING—Approval of new catalytic-cracking plant on Gulf Coast gives strong indication that process will continue importance in postwar era. . . . ¶Similar facilities started at Pacific Coast plant. . . . ¶Eastern movement of residual fuel oil relieves District 2 refinery storage. . . . Crude supply relegated to secondary importance in Middle West, yielding to problem of what to do with heavy fuel. . . . Seasonal consumption in North and East will rectify oversupply in a few weeks. . . . ¶Universal Oil Products may be established as endowment for scientific schools. . . .

MATERIALS—Administration accused of double talk in announcing plan to remove restrictions at end of European war. . . . Petroleum Industry War Council warned that equipment will continue short for several months. . . . ¶Petroleum industry's claim on steel for fourth quarter reduced 4 per cent . . . ¶Backlogs of tool-joint, pumping-rig, drill-pipe, and engine orders continue up. . . .

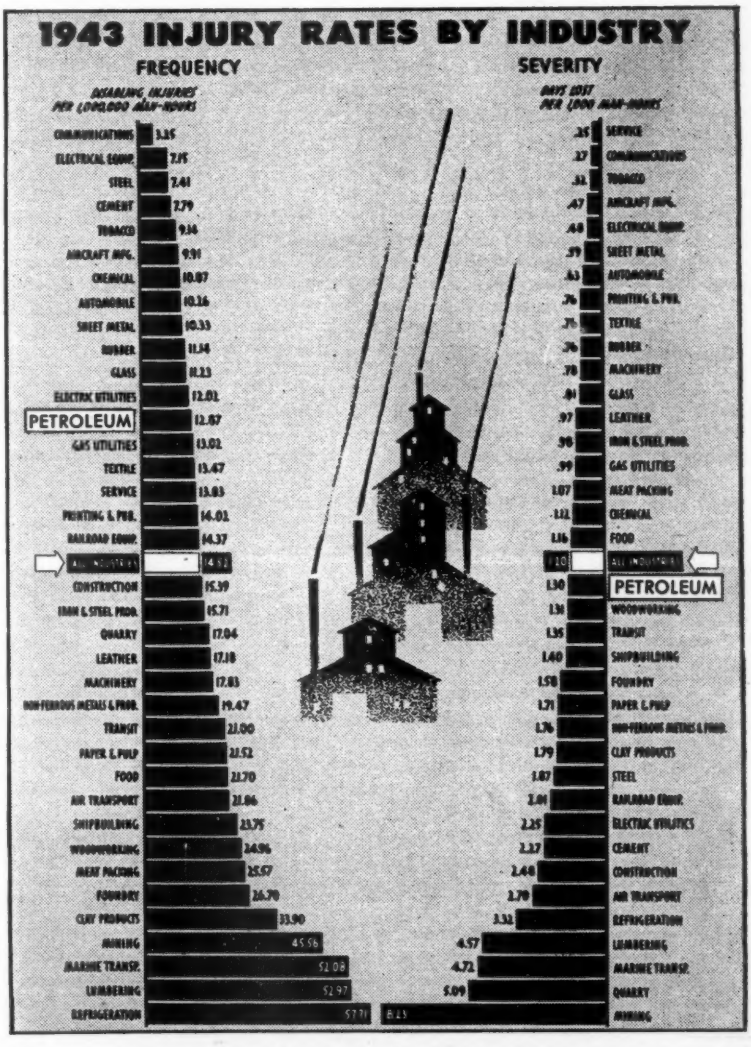
CONSUMPTION—Demand for all oils this year may total 1,914 million barrels, 20 per cent greater than in 1941. . . . ¶Current gasoline requirements running 16 per cent higher than last year. . . . ¶Swift return of normal trend in peacetime petroleum consumption anticipated, exceeding prewar level by 1947, after moderate slump in reconversion period. . . . ¶Thirty-six million passenger-car registrations expected in 1950. . . . ¶Probable demand in 1950 placed at 1,868,960,000 bbl.

INTERNATIONAL—Definite decision reached to postpone British-American oil-agreement hearings until after November election . . . ¶White House requests Secretary Hull to be on watch for cartels in postwar discussions with foreign powers. . . . ¶Another wage increase averts strike among Mexican oil workers. . . . ¶Substantial expansion in foreign development disclosed at PIWC meeting. . . .

DRILLING—Total wells finished last week set 1944 record of 489, average of 70 daily. . . . ¶Active rotary rigs increase to 1,729, highest rate of drilling operations in history . . . ¶Field transportation remains critical problem. . . . Industry ranked with fire departments in top priority bracket for heavy-duty truck tires. . . . Supply of casings, however, remains tight. . . .

PRODUCTION—Output of crude attains record peak of 4,696,800 bbl. daily, reflecting higher quotas in many fields for September. . . . PAW certification of 4,762,200 bbl. daily of crude this month is 65,400 bbl. above current operations. . . . California lagging 25,000 bbl. daily behind certified quota, Texas off the pace by 10,000 and Kansas is about 21,000 under allocation. . . .

NATURAL GAS—Most important recent Federal Power Commission hearing under way at Memphis. . . . At stake is FPC authority to judge line applications on merits of end use. . . . Gas companies fight expansion of FPC authority. . . . Several states support wedge by which exports could be halted or controlled. . . . Power to judge what are superior and inferior uses is chief issue. . . .



High rank of petroleum in the National Safety Council records is the result of constant efforts to improve working conditions

Demand for All Oils May Total 1,914,000,000 Bbl. in 1944

Gasoline Requirements Rise 16 Per Cent And Crude-Oil Demand Is Up 11 Per Cent

WASHINGTON. — Demand for all oils in the United States this year will total approximately 1,914,000,000 bbl., an increase of about 20 per cent over 1941, the last peacetime year, when requirements aggregated 1,595,000,000 bbl. This projection of demand was made last week by the Bureau of Mines in its regular monthly petroleum forecast report prepared under the supervision of A. G. White, chief, petroleum economics division.

"Total demand for motor fuel may exceed all previous records in 1944," the bureau reported. "During the first 6 months of 1944, this demand was about 23 per cent greater than in the same period of last year, compared with an increase in the combined total demand for residual and distillate fuel oils of about 15 per cent. The outstanding factors in the gain in total oil demand are the enormous amounts of aviation gasoline required and the rise in fuel-oil consumption for naval and shipping purposes.

"Such data as are available for the third quarter of 1944 indicate that total gasoline demand will be about 16 per cent greater and the demand for domestic crude petroleum about 11 per cent higher than for the same period of 1943.

"The daily average supply of domestic crude petroleum . . . to meet the market demand in September 1944 is 4,790,000 bbl., 401,600 bbl., or 9.2 per cent, higher than the demand in September 1943.

"Total demand for all oils rose from 1,420,000,000 in 1939 to 1,457,000,000 bbl. in 1940 and 1,595,000,000 bbl. in 1941.

Motor Fuel

"The estimate of total motor-fuel demand in September is 66,100,000 bbl., or 16.6 per cent higher than the actual demand in September 1943.

"Finished and unfinished gasoline inventories amounted to 81,984,000 bbl. on June 30, 1944, or 4,354,000 bbl. more than on June 30, 1943. Current statistics indicate a decline of about 1,600,000 bbl. in these stocks during July. In comparing current gasoline stocks with those of last year, it should be borne in mind that there was an abnormal liquidation of such stocks in the second quarter of 1943 and that any increases this year are proportionally much less than the increase in total demand.

"Direct sales of natural gasoline and imports are estimated at 2,400,000 bbl., making an indicated refinery production of 60,600,000 bbl."

SUMMARY OF FORECAST OF SEPTEMBER 1944
(Barrels)

	Forecast		Actual
	Sept. 1944	Aug. 1944	Sept. 1943
Demand for motor fuel*	66,100,000	68,200,000	56,671,000
Supply of motor fuel:			
Production	54,950,000	56,380,000	48,034,000
Natural gasoline at refineries	5,650,000	5,620,000	5,613,000
Total refinery production	60,600,000	62,000,000	53,647,000
Other natural gasoline and imports	2,400,000	2,500,000	1,546,000
Decrease in finished stocks	3,100,000	3,700,000	1,478,000
Available supply	66,100,000	68,200,000	56,671,000
Crude-oil requirements:			
Per cent yield of gasoline	39.00	39.10	38.10
Refinery crude required	140,900,000	144,200,000	126,088,000
Daily average	4,696,700	4,651,600	4,203,000
Domestic crude runs	136,900,000	139,900,000	123,872,000
Exports, fuel and losses	6,800,000	6,300,000	7,780,000
Total demand for domestic crude	143,700,000	146,200,000	131,652,000
Daily average	4,790,000	4,716,100	4,388,400
Decrease in domestic stocks	.....	.....	1,245,000
Actual production	.....	.....	130,407,000
Daily average	.....	.....	4,346,500

*The term "motor fuel" as used in this report includes gasoline and naphtha used for all purposes, but does not include heavier distillates used in the operation of tractors or burned in diesel engines.

Three Tide Water Veterans Promoted to Higher Posts

NEW YORK.—Three veteran executives of Tide Water Associated Oil Co. have been promoted to posts of greater responsibility. H. S. Chase and Drew L. Hines have been appointed vice presidents, and R. K. Kelly has been named assistant vice president.

H. S. CHASE

Chase, with more than 22 years of service with the company in refining operations, will continue in charge of manufacturing in the eastern division. Until early last year he was general superintendent of the company's refinery at Bayonne, N. J.

D. L. HINES

R. K. KELLY

Hines, for more than 21 years employed in the company's engineering, construction and transportation operations, will remain in charge of transportation and supplies of the eastern division. Until last May he was assistant manager of transportation of the western division.

Kelly, in the company's service more than 15 years in its eastern division marine transportation operations, will continue in charge of the eastern division marine department.

FEA Limits Validity Period on Oil Exports

WASHINGTON. — Export documents authorizing shipment of petroleum and petroleum products will be limited in validity in the future to certain destinations, the Foreign Economic Administration announced this week.

The move resulted from a need for better scheduling of quantities.

War-Plant Operators Asked to Declare Purchase Intentions

WASHINGTON. — Secretary of Commerce Jesse Jones this week queried the operators of 586 government-owned war plants on their interest in purchasing the facilities when they become surplus.

The plants involved are complete installations, where land, buildings, machinery and equipment are owned by Defense Plants Corp., and are distinguished, the secretary pointed out, from privately owned plants in which DPC has added buildings, machinery and equipment. Some of the plants are operated for account of RFC agencies, others are under lease to the operators. Leases provide for cancellation when the product is no longer needed in the war effort.

The secretary's telegram to 376 operators of plants built at a cost of $4,720,000, follows:

"While we do not know how soon the Defense Plant Corp., buildings which you are leasing will become surplus to the war effort, we would like to know whether or not you contemplate acquiring the property for postwar civilian activities, either under your option or through negotiation. I am sure you can understand the problems which will confront all of us, and that you want to do everything you can to prevent unemployment in the reconversion period. We will greatly appreciate your cooperation in advising us as quickly as possible. We need the information to aid us in planning to keep as many of the properties as possible in production."

Rapid Expansion of Cooperatives Credited to Favored Tax Position

PETROLEUM cooperatives, largely because of their favored position in regard to federal revenue taxes, are expanding 10 times as fast as the privately owned companies, Loring A. Schuler, general manager of the National Tax Equality Association of Chicago, explained to the Tulsa Chamber of Commerce at its weekly luncheon September 8. The meeting was arranged by the chamber's oil-activities department and P. H. Bohart, executive assistant of Gulf Oil Corp., president of the Tulsa Chamber of Commerce, presided.

Disclaiming any animosity toward the cooperative movement, as such, Schuler pointed to the recent tremendous growth of cooperative holding companies in many fields of manufacturing and selling, and attributed that expansion to the cooperatives' exemption from payment of federal income and excess-profits taxes. "While free enterprise is digging into its earnings to pay up to 80 per cent in federal taxes," he said, "the cooperatives are able to keep their entire profits and use them to pyramid capital at a streamlined rate impossible to private business."

He cited the case of a large cooperative association which has accumulated $8,000,000 of oil wells, refineries, canneries, feed mills and so on, largely through tax exemption, explaining that the association built a refinery in Kansas a few years ago and paid for it in about 2 years, out of untaxed profits. It would have taken a privately owned company 15 years to pay for such a refinery out of profits left after it paid taxes at the present rate, Schuler said.

Supply Fifth of Farm Demand

In 1942, according to Schuler, petroleum cooperatives did $252,000,000 of business. Local cooperatives now supply 20 per cent of the gas and oil used on American farms and are rapidly invading the city market. Seventeen major cooperative purchasing associations sold $55,000,000 of petroleum products in 1942. Nine regional cooperatives own 11 refineries, for which they paid $13,500,000, and they are planning to buy more when the war ends. Oil-producing and refining operations accounted for an additional $12,000,000 of business.

"If the petroleum cooperatives had paid taxes at the same rate as their independent company competitors, the U. S. Treasury would have been richer by at least $10,000,000," Schuler said. "Furthermore, if all cooperatives were taxed on a basis of equality with private enterprise, the Government would collect a billion a year that it now desperately needs to pay for the war. Instead of that, revenues are constantly being depleted as taxpaying enterprises are being bought by cooperatives and moved into tax-exempt status. In the past year alone, millions of dollars worth of oil properties, refineries, grain elevators, electric companies, insurance companies, coal mines, farm-implement companies and many others have been removed from the tax rolls in this way."

Solution of the problem, Schuler said, is equality of taxation, either by the elimination of the federal corporation income and excess-profits taxes, or by the taxation of the cooperatives and government-owned businesses.

"But we must be realistic about this matter," he continued. "For as long as we live, the federal budget will be 20 to 25 billions a year. That means that every possible source of taxes must be tapped to raise this huge sum. The only fair way is to tax all business, including the cooperatives on a basis of absolute equality. That will not only add to the federal revenue, but will also make possible some reductions in the general rates of all taxes and will protect the American system of free enterprise and free markets from what is today an utterly unfair competition."

Moorlane Honored for Excellence of Production

The Army-Navy "E" for excellence of production was awarded September 8 to Moorlane Co., Tulsa. Col. F. J. Wilson, district engineer, said in presenting the emblem that the company's products pump "lifeblood to the advancing armies in Europe." W. D. Moorer, president of the company, responded that the honor would be "a daily reminder that we must continue our production of war material until the conflict is ended." Moorlane is a major subcontractor in the manufacture of portable pipe line facilities which feed gasoline to front lines from supply bases.

Quaker State Buys Forest And Niagara Properties

OIL CITY, Pa.—Quaker State Oil Refining Corp. has purchased from Niagara Oil Corp. and Forest Oil Corp., both of Bradford, Pa., all the producing oil properties owned by these two concerns in Pennsylvania. Officials of Forest and Niagara say they will continue to operate their properties in Texas, Kansas, Indiana and Illinois.

Jester Says Ickes' Letter Incomplete

AUSTIN. — Petroleum Administrator Harold L. Ickes was accused here this week by Railroad Commission Chairman Beauford Jester of giving an incomplete statement of the federal powers over petroleum.

Jester said that Administrator Ickes had ignored numerous points in his letter asking for a frank statement on postwar policy of PAW.

"What about the PAW certifications of demand which we have carefully adhered to?" Jester asked.

"What about the regulation that requires that after a well has been completed for production of condensate we must wait 15 days to get a PAW permit to produce?

"What about the PAW's control over refining and transportation?"

Jester spent this week in Washington discussing the matter personally with members of the Texas delegation to Congress.

Letters:

Editor's note: This is the reply to the letter published on page 72 of the August 26 Journal in which Beauford H. Jester, chairman of the Texas Railroad Commission, wrote Administrator Ickes that "it is now proper and timely to announce the plan . . . which the Petroleum Administration for War will follow in returning regulation of oil and gas to the oil-producing states."

Ickes' reply:

"My dear Mr. Jester:

"In your letter to me of August 15 you request that the petroleum administration announce a 'plan and processes' for its 'liquidation' and for 'returning the regulation of oil and gas to the oil-producing states.'

"I repeat and reiterate what I have said many times. The Petroleum Administration for War is a war agency. Its regulations and restrictions are being relaxed and will continue to be relaxed and revoked as rapidly as war conditions permit. The only regulations of the Petroleum Administration which even indirectly affect matters over which your commission has jurisdiction are those which regulate the use of materials for the drilling of oil and gas wells on tracts of prescribed areas. With the relaxation and revocation of these regulations, all of the states and their regulatory authorities are automatically left free to control these drilling operations in such a manner as they determine to be necessary. I am at a loss to understand how it would be possible to present any more definite 'plan and processes' for 'returning the regulation of oil and gas to the oil-producing states.'

"You state that you have certain proposals to make which will be of aid to the oil industry and to all state regulatory bodies. Since these proposals affect all the oil-producing states, may I suggest that they be submitted to the National Conference of Petroleum Regulatory Authorities. This body is composed of representatives of the state regulatory agencies and was created by the Petroleum Administration for the purpose of considering and making recommendations to this agency with respect to proposals of the character you seem to have in mind. I shall be glad, of course, to consider with that conference any proposals which you or the members of your commission desire to submit."

Sincerely yours,
HAROLD L. ICKES.

Editor's note: Views defending policies of PAW were expressed in a letter from the top executive of a representative producing company in California.

PAW Policies Defended:

"Dear Sirs:

"Considering the fact that we are in a war and therefore of necessity susceptible to a certain amount of arbitrary dictation I have not thought that the methods or requirements of the oil and gas production arm of PAW have been unduly dictatorial or burdensome.

"It has seemed to me that the states, such as Texas, that have oil control laws are in a much better position for self-control; in that such laws function as a buffer between the oil producer and PAW, than California, for example, that has no oil control law and therefore is wide open to the full force of arbitrariness, inexperience and experimenting.

"It appears to me also that the natural and human concern, on the part of such officials as Chairman Jester; that their prerogatives are not usurped or set aside by over zealous personnel of PAW, tends to lay more stress upon the activities of PAW than is justified.

"For example, as an offset to Jester's complaint that some Texas fields have produced above their maximum efficient rate I venture to say that oil fields generally throughout the country have not only been exposed to a greater degree of reservoir engineering but actually have been more scientifically developed and produced during the war period than at any time in the history of the oil business. The fact that some fields in Texas and certain specific fields in California are now being produced in excess of maximum-efficient rates as a matter of military necessity should not be charged to PAW as an improper or wasteful procedure.

"As a matter of fact one of the most onerous and impractical requirements of the PAW setup—namely, 40-acre spacing, is directly the result of prewar propagandizing of the industry by proponents of wide spacing as a means of reducing the drilling of new wells and bringing in of more production.

"It appears to me that the Texas Railroad Commission instead of asking PAW what are its liquidation plans should be telling PAW how that agency may best be liquidated upon decline and cessation of military demand and constructively preparing plans to take over forthwith.

"If the Texas Railroad Commission believes that maximum-efficient rates are a fundamental basis of evaluating reservoir performance now is the time when it should be studying each critical pool and determining as closely as may be its MER, both current and after say a 6-month or a year's decline. Then, when the excessive military requirements cease productions may be dropped back in an organized way.

"In reading Chairman Jester's letter it is hard to determine whether the difficulties which he anticipates are imagined or based upon some real information as to purposes of PAW 'or any other federal agency' which is not divulged in the letter.

"Personally, I have figured that PAW, as such, will be liquidated at the close of the war and that California producers should prepare in advance to handle the problems of supply and demand that will surge in upon them at that time. Actually, I had thought that the State of Texas with its oil-control laws is in an excellent position to resume the control and regulation of its oil-field problems. I don't doubt but what Chairman Jester thinks so also. Therefore, is not his letter just a 'haymaker' or two in round one?"

Yours very truly,
(Operator's name withheld).

Small Business Committee Hearing Date Set

WASHINGTON.—The Small Business Committee of the House of Representatives will hold hearings on the problems of independent oil producers in reconversion September 20 and 21 in Austin, Tex., Rep. Wright Patman, Texas, chairman of the committee, announced this week. The full committee is expected to be present.

The Independent Petroleum Association of America is cooperating with the committee, and the association's Washington office said this week that representative producers from all oil states are being invited to attend the hearings.

J. K. Brim, Sulphur Springs, Tex., will be attorney for the committee.

The regular monthly proration hearing of Texas independents will be held in Austin September 19, Col. Ernest O. Thompson, member of the Texas Railroad Commission, announced, and this group plans to stay in Austin for the Patman committee hearings.

Colonel Thompson pointed out that when Germany falls, in view of the recapture of European oil fields, there will be less demand for oil production in America. With the prospect of reduced demand, the small independent producers face a real conversion problem.

"For this and other reasons," Colonel Thompson said, "the little fellow will likely be in bad plight."

W. H. Newman Appointed PAW Executive Officer

WASHINGTON.—Dr. W. H. Newman, since last May director of organization planning for Petroleum Administration for War, was named executive officer for PAW last week. His new post places two PAW divisions under one head. He will continue to direct the work of the organization planning staff and will also perform the duties of executive officer, replacing E. L. Kohler, who resigned.

Newman, a graduate of Friends University, received the degree Ph.D. from University of Chicago, served as associate professor of business at Miami University and as assistant professor of industry at University of Pennsylvania. He has been in federal service since 1942.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

Synthetic Rubber

AS one studies Rubber Director Dewey's final report, released after his recent retirement, the conclusion is inescapable that the large-scale production of synthetic rubber should continue permanently in the postwar period. From the petroleum viewpoint it is a petro-chemical development of the war whose commercial base is already soundly established.

Mr. Dewey summarizes his findings in two sentences: "Without the synthetic rubber now being produced in adequate supply, the war effort and victory would not be possible," and "regardless of whether or not sufficient crude rubber may ever be available to supply the postwar demand at prices less than the cost of synthetic—a situation I cannot foresee—I cannot conceive, under any circumstances, of anyone considering scrapping the low-cost producers of the synthetic-rubber program."

The scheduled output of synthetic rubber in this country and Canada the last quarter of this year is at the rate of 865,000 long tons yearly. Of this 93 per cent is buna-S or butyl rubber. The principal component of this synthetic rubber is butadiene, and 66 per cent of the production of 687,000 tons yearly is to come from petroleum.

The low-cost position of the oil industry's contribution to this new art is of particular interest. The report arrives at an out-of-pocket cost of 8 cents per pound, for butadiene, which, when copolmerized with styrene at 7 cents, gives a buna-S charge of 12.2 cents per pound. It is estimated that in the postwar period this figure can be reduced to 10.7 cents. These costs compare with the 1933-1942 average price of 16.49 cents per pound for natural rubber in the New York market.

Furthermore, when the butadiene is manufactured in specially constructed plants now in operation at petroleum refineries the cost is approximately one-third the 37-cents-per-pound charge which is representative of the production costs from alcohol. The alcohol method received first consideration in the butadiene program because plants which used the product as raw material could be more quickly constructed than the butadiene-from-petroleum units.

The detailed analysis of the natural-rubber situation, which was part of the rubber director's report, supports the plans to continue the production of synthetic rubber in this country. It is conceded that two or more years will be required to bring about substantial production in the East Indies area after the Japanese war ends. Future costs of natural rubber will vary with developments in tax rates, monetary values, labor policies and other conditions, all of which point to higher prices in the postwar period.

There are other developments which are distinctly favorable to synthetic rubber. Lower manufacturing costs, which are not reflected in the foregoing investigation, have recently been made effective. Improved performance in tires is reported from month to month as manufacturers of the finished products become more familiar with the properties of the new rubber.

The oil business has a national duty as well as industrial interest in seeing that sound policies are adopted in reconversion of the $700,000,000 investment in synthetic rubber. The petroleum industry's position should be controlling in any program because it can either stop where it is as a manufacturer of components or go the whole distance if necessary and become a manufacturer and distributor of the finished products.

Industry Denied Full Request For Steel in Fourth Quarter

WASHINGTON. — The petroleum industry was cut 20,000 tons, or 4 per cent under its estimated requirements for steel for the fourth quarter of this year because the total of all claimant agencies before the War Production Board was 123 per cent of the supply of carbon steel and 136 per cent of the supply of alloy steel, Claude P. Parsons, PAW director of materials, told the production committee of the Petroleum Industry War Council September 12.

This cut was made because WPB contended the inventory of oil-country tubular goods is excessive, Parsons explained, but PAW is checking the inventories and if found not excessive it will ask reconsideration of its allotment.

With 1,729 rotary drilling rigs in operation now, far above previous peaks, most drilling equipment will remain tight, and Parsons observed that foreign drilling is expanding and that there may soon be demands for steel to rehabilitate reconquered oil fields, so he did not hold out much hope for an early easing of supplies.

Manufacturing Rate Increasing

Production of drilling equipment continues to expand but is not keeping up with increased rate of drilling, Parsons reported. Drill pipe produced during the second quarter was 2,324,831 ft., compared with 2,120,000 ft., the first quarter. During July 23,701 tool joints were produced but the backlog of unfilled orders rose to 332,498. There were 813 pumping units manufactured in July but the backlog of unfilled orders increased to 6,601.

Production of internal combustion engines continues to improve but this item is still a bottleneck. Parsons said PAW is expediting delivery of components from subcontractors but some producers show more tendency than others to assist in providing engines for the petroleum industry, and he added "operators are doubtless finding this out in their search for engines. It is time that shortsighted manufacturers wake up."

Parsons reported that lumber is one of the tightest commodities and while the oil industry has received an allotment that should meet essential requirements it is necessary to use every possible means of conservation.

PAW induced the Office of Defense Transportation to meet the oil industry's essential needs for heavy and light trucks out of its civilian pool. No light trucks are available but PAW located some used light trucks as surplus military property and is working out a method whereby its district offices can help oil operators obtain these through the Treasury Procurement Division.

Heavy truck tires are extremely critical, but Parsons reported the petroleum industry, except for retail marketing, has been given top priority, the only industry ranking with fire engines, but there are only 138,000 heavy tires to meet the current demand of 300,000 for priorities 1 and 2.

Referring to WPB reconversion plans, Parsons said this makes lively conversation but the matter is still in its theoretical stage and needs considerable clarification and discussion. Meanwhile, he said, the industry must proceed on the realistic basis that the war is not yet over.

Double Talk Suspected in Plan to Release Controls Over Materials

by Henry D. Ralph

WASHINGTON.—The oil industry should not jump at conclusions regarding the administration's announcements that virtually all priority and other business controls will be lifted immediately after the defeat of Germany.

It does not follow that the Petroleum Administration for War will be folded up as soon as fighting stops in Germany, nor that there will be no controls whatever over the use of materials while the Japanese war continues.

The announcement by Acting Chairman J. A. Krug of the War Production Board and the demobilization report of Director James F. Byrnes of the Office of War Mobilization promise that "almost all" controls over materials will be lifted "except" that a "few selected" controls may have to be kept or reinstated for prosecution of the war with Japan or for the protection of essential industries.

Since all controls over materials exercised by PAW have been delegated to it by WPB, the collapse of Germany undoubtedly will see the end of P-98-b and all other regulations and orders affecting the oil industry's use of materials. This probably will mean the end of drilling and well-spacing restrictions, since their enforcement at present depends on control of materials. However, lumber, rubber, manila hemp, certain chemicals, and perhaps some other commodities will still be subject to a certain amount of control by WPB, and this may also be true of some "components," such as bearings or motors, for some time.

PAW's Petroleum Administrative Order 11, which restricts drilling, has the basis of its authority in WPB Limitation Order 41, which controls construction of all kinds. Because of this drillers do not have to get specific WPB authority for each well as a construction project.

Although the Byrnes statement indicates that all L and M orders will be revoked, PAW officials do not think that all restrictions on construction of every type will be lifted immediately. If this is done, of course, PAO 11 will have no force and drillers as well as refiners will have to scramble with all other types of construction of whatever materials are available. It is possible that L-41 will be retained in modified form, or some other limitation of construction substituted for it, in which case drillers might have to apply to WPB for individual priorities for each well unless PAO 11 or something like it is continued in effect as a blanket exemption.

Sudden Release Undesirable

With all priorities, inventory restrictions, and other materials controls suddenly lifted there might be such a scramble for equipment that the oil industry would have difficulty filling its essential requirements in competition with industries which have been denied supplies all during the war. To guard against such a situation WPB contemplates a very simple sort of pricrities system with a "preference rating band" for essential civilian industries, lower than the military priorities needed for the Japanese war.

Such a plan could be applied to the oil industry if real need for it

developed, but some industry men are of the opinion that it will not be necessary. They believe that the oil industry is such a good customer that it will automatically get preference on the order books of manufacturers, and that its essential character will be recognized without any government controls.

Chairman Krug's announcement came so suddenly it apparently caught off balance the various operating divisions of WPB and its satellite control agencies such as PAW. Each division seemed to have a different idea of how soon and to what extent its controls would be dropped after Germany's end, and what conditions might confront their industries at that time. Staff memos are circulating and daily conferences are being held in an attempt to fill in details of the plan.

PAW officials concerned with materials control have had several conferences since the WPB plan was announced. They declare that PAW's plans will be well worked out when the time comes to apply them, though it may be some time before they are ready for announcement.

Publicly these officials stress the obvious fact that until the war ends all controls remain in effect and materials of all kinds are still very short.

The unofficial reaction in Washington is generally that the administration's announcement was made prematurely, and before details had been perfected, and that to a large extent it was timed for political effect. The reservations about possible reinstatement of certain controls is referred to as "double talk." One industry man declared that a dozen different interpretations could be put on the Byrnes announcement and they would all be wrong.

Briefly, the announcement promises:

The Controlled Materials Plan, under which PAW as claimant agency obtains allotments of steel for the oil industry, will die at the end of the quarter in which Germany surrenders.

All L (limitation) and M (conservation) orders will be revoked immediately except for commodities still short.

The priority system will be reduced to a single military preference rating, a special high emergency rating, and a subordinate band of ratings for essential civilian industries to be used only if found necessary.

Any manufacturer may make anything to the extent that his plant and labor force is not occupied with continued war orders.

Manufacturers may accept and fill any orders from anyone except that military orders get preference.

War production contracts will be cut back some 40 per cent, over all, immediately.

Manpower controls will be lifted except as local committees determine that some restrictions should be maintained for a while in certain areas.

WPB will retain its authority to impose whatever controls may appear necessary.

Owners of U.O.P. May Give Holdings to Scientific Schools

CHICAGO. — Confirmation was given here this week to reports that owners of Universal Oil Products Co. are studying plans to completely divest themselves of control and interest in the company.

The plan reported to have received most favorable consideration from the several proposals advanced is that which would establish the company as an endowment for scientific schools such as Massachusetts Institute of Technology, California Institute of Technology, and similar institutions.

The Universal organization, it was declared here, has been assured that no plan will be adopted involving its dissolution nor will any action be taken that will affect the welfare of the company which will continue with its research and development. The company, it is understood, will continue its previous service to the refining industry, especially to licensees which number approximately 100.

Income from ownership and securities of U.O.P., if assigned to technical schools, would be used for research and development in the petroleum - hydrocarbon field. No definite conclusion, however, has been reached with respect to the school-endowment plan, U.O.P. officials explained.

The Dubbs cracking process is the nucleus around which U.O.P. was organized but the company has been devoting its entire efforts recently to the aviation-gasoline program. Six basic processes developed by Universal are involved, along with those developed by other organizations, in the aviation-fuel program. U.O.P. processes are utilized in approximately 75 installations for production of aviation gasoline at different refineries scattered throughout the United States.

An engineering firm, it was understood, is appraising the worth of U. O. P., which includes many valuable refining patents. Varying shares of Universal are owned by Standard Oil Co. (Indiana), Shell Oil Co., Inc., Gulf Oil Corp., Standard Oil Co. of California, The Texas Co., Atlantic Refining Co., Standard Oil Co. (New Jersey), and Phillips Petroleum Co.

Jap Aviation-Fuel Operations Traced

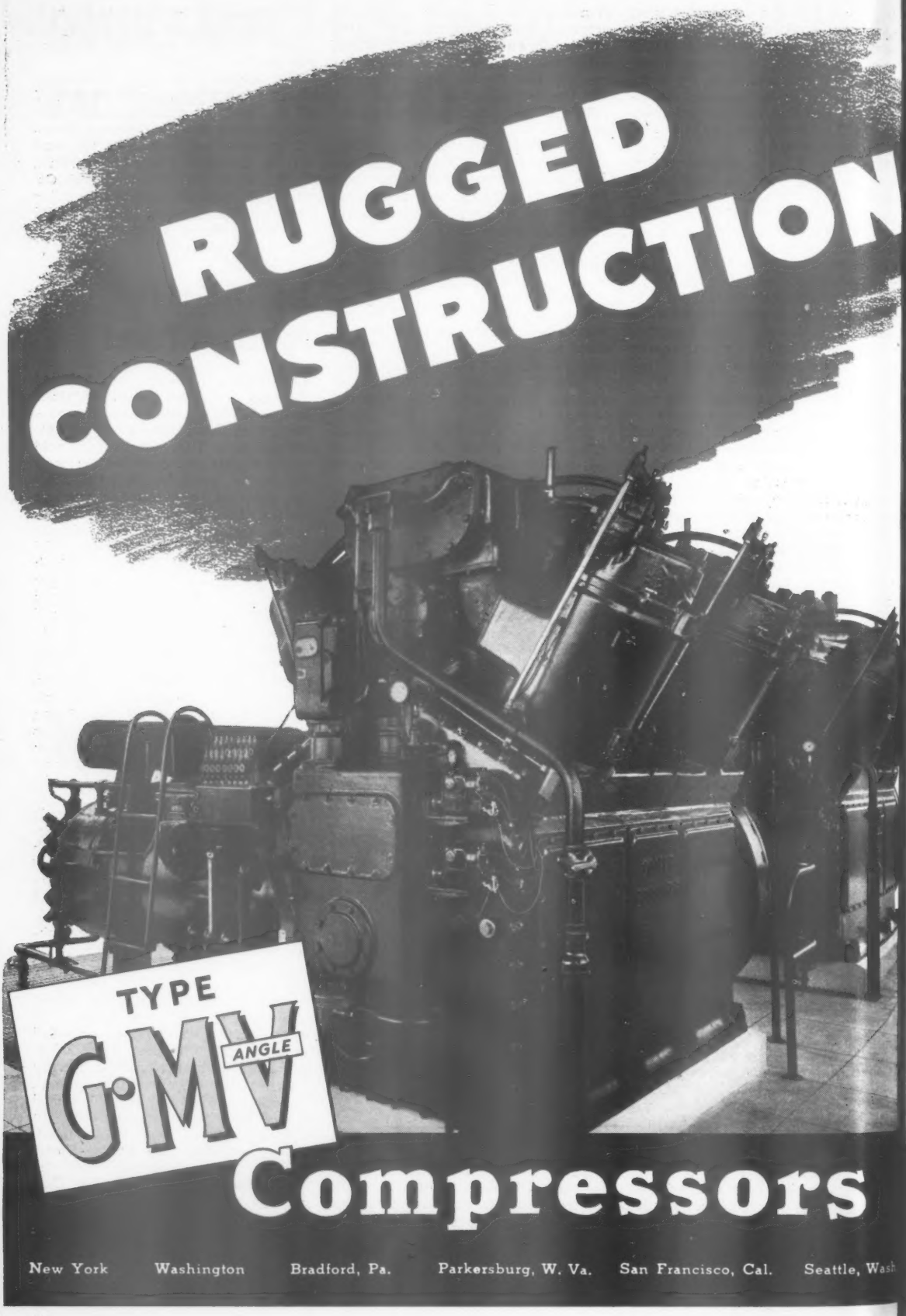
WASHINGTON. — The detailed story of how Japan obtained technical information on the manufacture of 100-octane aviation gasoline prior to Pearl Harbor was told to the Senate war mobilization committee last week by James S. Martin, chief of the economic warfare section of the Department of Justice.

The story was obtained chiefly from the files of the Universal Oil Products Co. of Chicago, which made them available to the Justice Department for the study. Martin told the committee that Universal is not under investigation by the Justice Department and that the company's actions were legal and were common commercial practice, although he pointed out that Universal made available to Japan some technical information, such as the manufacture of catalysts, which it withheld from American oil companies holding similar patent licenses.

The story was told as an example of how Japan was able to use ordinary commercial channels to obtain technical and trade information of great military value. The committee is studying international cartels and their possible postwar control.

Contracts and correspondence submitted to the committee related how the Japan Gasoline Co. maintained relationships with U.O.P. from 1928 until the State Department's "moral embargo" against such dealings in 1939. The Japan company obtained various patent licenses from U.O.P. and in 1938 obtained rights to every U.O.P. petroleum refining patent, including catalysts and technical "know-how." For several months in 1939 a group of some 30 Japanese, including Army and Navy officers and others not connected with the Japan Gasoline Co., studied in Universal's laboratories and were given detailed instructions regarding U.O.P. processes for manufacture of high-octane gasoline.

Even after this was discontinued, the files showed, Japanese business-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ONE REASON WHY MEN WHO KNOW COMPRESSORS BEST PREFER GMV's

Cooper-Bessemer GMV compressors are built for heavy-duty jobs in the oil and gas fields, refineries, gasoline plants, gas distribution stations, pressure maintenance, re-pressuring, and re-cycling plants.

To give 100% performance under continuous loads, every part from base to automatic controls is designed and built to meet the most severe operating conditions—backed by the knowledge and skill of men who have been building compressors for more than thirty years.

Some important factors in the GMV's rugged strength are:

1. Meehanite Metal with its unusual strength, uniformity, and freedom from internal weaknesses is used for all parts which would normally be made of cast iron.
2. The shorter, "V"-engine crankshaft is more rigid. In the GMV, exceptionally high diameter-to-length ratio makes it all the more rugged and immune to torsional stresses.
3. Two precision-type main bearings for each crankthrow afford maximum load bearing surface and optimum load distribution.
4. The GMV articulated connecting rod design combines each compressor rod and pair of power rods into an unusually rugged, well-balanced unit assembly.
5. A patented saddle-end piston pin construction, with full-length solid bronze bearings, provides twice the bearing area otherwise possible.
6. Honed power cylinders and plated pistons are of wear-resisting Meehanite.
7. Low and medium pressure compressor cylinder bodies are of high-strength Meehanite and cast steel respectively. High pressure bodies are forged steel.
8. Incorporated into one strong, simple design, the scavenging air header, oil sump and air intake are all cast within the engine base.

by **Cooper-Bessemer**

MOUNT VERNON, OHIO and GROVE CITY, PENNA.

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men in this country reported to Japan much information, obtained through commercial contacts, which might be of military value. Among such was the report that the United States was building up large stocks of petroleum products in the Hawaiian Islands.

Advancement of Key Men Announced by Carter

Advancement of key men in the production department of The Carter Oil Co. was announced last week by O. C. Schorp, president. R. L. Clifton, for the past 6 months acting manager of the department, was named manager. In Carter service since 1917, Clifton had been general production superintendent 8 years. M. A. Wright, former chief engineer, was appointed assistant production manager, and Ralph E. Damp was confirmed as general production superintendent. Succeeding Wright as chief engineer is Carl G. Herrington, former division engineer and assistant division superintendent of Carter's central division at Seminole. W. E. Leroux was appointed division engineer of the central division.

Lloyd G. Owen, vice president and general counsel, retired September 11 after 24 years' service. Forrest M. Darrough was named general counsel and a director.

OPA Qualifies Four Pools for Subsidy Price

WASHINGTON. — The Office of Price Administration this week added two pools to the stripper-well subsidy list, with payments retroactive to September 1, and also reported the late addition of two for which payments are retroactive to August 1.

In Oklahoma, Fitts pool (Gilcrease, Cromwell, Hunton lime and upper Simpson series), Pontotoc County, were added at 20 cents. In Kansas, Hollow pool in Mikkel and Hardy counties, was added at 20 cents, and Brown pool, Cowley County, at 25 cents, both retroactive to September 1.

Two Indiana pools, Vernon Heights, Vanderberg County, at 25 cents, and Varner, Spencer County, at 35 cents, were added to the group whose payments become retroactive to August 1.

No Hearings on Oil Pact Until After Election

WASHINGTON.—Hearings on the Anglo-American oil agreement have been postponed until after the November election, Tom Connally, chairman of the Senate foreign relations committee, has announced. Connally said it would be difficult to conduct hearings in the absence of a quorum of committee members.

President Roosevelt recently sent the agreement to the Senate in the form of a treaty, requiring ratification by two-thirds of the Senate's members. Connally said the committee voted postponement of hearings in view of the probable recess of Congress.

"The committee is anxious to have the views, not only of the industry, but of the public generally on this important matter," Connally said.

Texas Co. Acquires Landon Oil Holdings in Kansas

Negotiations between The Texas Co. and former Gov. A. M. Landon were closed this week with acquisition of the latter's oil properties in Kansas by Texas. The transfers, recorded in Butler, Reno, Stafford and other Kansas counties, showed Texas obtained around 500 bbl. a day of flush production and some tracts on which it may drill additional wells.

The major item in the transaction was three producing leases in the Zenith pool of Stafford and Reno counties. Two other producing leases were in Butler County. Fourteen nonproducing leases were included. The consideration involved was not made public.

The transfer, with certified check, was retroactive as of June 15.

Mexican Oil Workers Get Raise, Averting Strike

MEXICO CITY.—A prolonged dispute, which threatened to end in a strike, has been settled by the signing of a new contract between the Mexican petroleum administration and Union of Petroleum Workers. The contract, which became effective September 8, grants raises in pay and other advantages which amount to about $5,600,000 annually.

Oil Rights Taken From Surplus-Property Bills

WASHINGTON. — A conference committee now reconciling differences between the surplus war-property disposal bills passed by House and Senate was reported to have knocked out a provision reserving mineral rights on homestead land for the federal Government.

As passed by the Senate, the secretary of interior was directed to reserve for the United States all oil, gas and other mineral deposits in the property, except in the case of a sale to the original owner or his lineal heirs or tenants, or to a veteran or veteran's wife and children.

In the Senate bill, the secretary of interior is directed to sell the Moore Airfield in Cleveland County, Oklahoma, without warranty to the persons, or their heirs, from whom the Navy originally acquired the tract. The bill provides that the sale price shall cover original purchase price and money spent by the Navy on the land. The Moore tract, condemned by Navy for use as an airfield and later declared surplus, has become a test case. Oil was subsequently discovered adjacent to the field, and the original owners are seeking to repurchase approximately 500 acres at near original cost, rather than at the present enhanced value due to oil discovery.

DEATHS

John A Brown, 59, president of Socony-Vacuum Oil Co., died September 9 in Royal Victoria Hospital, Montreal. He had gone to Quebec Province for a vacation and last month underwent an abdominal operation. Brown was chairman of the general committee of the oil industry in District 1, comprising 17 eastern states and District of Columbia; member of Petroleum Industry War Council and chairman of the national oil policy committee. He also was an industry adviser to the Anglo-American conference on oil policies last April. Born at Hampton, Pa., Brown took a job as general utility boy for a Philadelphia hardware store at $5 a week. After attending Girard College he was employed in the auditor's department of Pennsylvania Coal & Coke Co. He entered the oil business in 1911 as secretary-treasurer of a small oil company in Taft, Calif. Later he spent 11 years in Mexico and the Dutch East Indies as an official of Standard Oil Co., of New Jersey. Following his return to the United States he served as vice president and later as president of General Petroleum Corp. in Los Angeles. In 1933 he went to New York to become head of Socony-Vacuum Oil Co., Inc., formed in 1931 as a merger of Standard Oil Co. of New York and Vacuum Oil Co. For many years he was a director of American Petroleum Institute and a member of its executive committee. Brown was named a director of Chase National Bank of New York in 1934 and a member of its executive committee in 1942. He was vice president of New York State Chamber of Commerce.

Frank C. Merrow, 89, rig-building contractor, died September 3 in Bradford, Pa.

Use of Cylinders in Directional Drilling Important Contribution to Technique

by L. P. Stockman

INCREASES in directionally drilled wells, particularly in certain California tideland areas where deflected holes are becoming somewhat congested, have resulted in a threefold increment in the use of the so-called cylinder method of predetermining the course and controlling such operations. Data for the first 6 months indicate that approximately 100 control jobs drilled through cylinders of 100 ft. diameter or less will be completed by end of the year. The previous peak in application of the cylinder method to directional drilling was in 1943 when 32 jobs were completed.

DATA ON CONTROL JOBS DRILLED THROUGH CYLINDERS OF 100 FT. DIAMETER OR LESS

Year	No. of jobs	Average drift	Total deflection
1938	9	16° 30′	5,443
1939	27	28° 30′	35,867
1940	23	26°	25,628
1941	27	31°	41,959
1942	16	36°	28,508
1943	32	32°	45,039
1944 to July	49	27°	58,684

Improvements in directional drilling techniques and in surveying instruments have aided materially in gaining wider application of the cylinder method which imposes a penalty for inefficient operations by limiting the tolerance of drift and degree of inclination of an oriented hole to a predetermined subsurface point.

Projection of an imaginary cylinder from the surface location to a predetermined subsurface point has two particular advantages which are becoming more pertinent with each new deflected well in areas of concentrated drilling. (1) By controlling the directionally drilled hole within a prescribed cylindrical radius the operator runs little risk of damaging neighboring wells. (2) Confinement of the directionally drilled hole within a projected cylinder creates a permanent record for future guidance, showing operators the subsurface zones of danger to be avoided in order to prevent damage to or from previously completed wells.

A three-fold increase is indicated this year in the so-called cylinder method of directional drilling. This article describes conditions accounting for the wider application of the technique. A record deflection of 5,072 ft. in a measured depth of 7,027 ft. also is reported herein for a California operation.

The method consists of an imaginary cylinder extending from surface location to the predetermined bottom of a hole. The outline of the cylinder which may have any reasonable radius is plotted from the surface to the completion point before drilling is started. These cylinders outline the course of the projected hole within a given radius, usually 100 ft., and operators require that drillers or contractors keep the hole within the limits of the cylinder. Thus the drift, direction, and degree of inclination are defined and regulated within prescribed limits. In addition to the outline of the cylinder from a vertical and horizontal standpoint, some operators outline the periphery of the cylinder and check closely to see if the drift is toward any special direction. When the hole is surveyed, the reading is placed at the proper point in the preplotted cylinder. Thus operators may determine whether the hole is following the predetermined course as drilling progresses.

New Directional Drilling Record

A record established recently by a California prospector is indicative of the advancement in directional drilling and the almost unlimited possibilities of applying this technique to exploratory operations. This record was established in a wildcat well which showed a deflection of 5,072 ft. in a measured depth of 7,027 ft. and a vertical depth of 4,327 ft. The drift angle was approximately 60°. It is believed that this is the first hole to show a deflection in excess of 5,000 ft.

Deflection was started at 300 ft. where the first whipstock was employed. A second whipstock was used at 870 ft. and the third and last was set at 1,221 ft. The hole was cored almost continuously from top to bottom. A second wildcat probably will be drilled in the same area. The first test proved unproductive. The log of the first hole, which showed some encouragement, may enable the operator to spot the next test in a more favorable structural location.

Directional Drilling Advantages

Directional drilling permits control of the bottom-hole spacing program and at the same time increases penetration into the oil sand. This is especially important at Huntington Beach, California, where operators are developing tidelands and in the Long Beach Harbor section of the Wilmington field where development covers both submerged land and acreage beneath leases occupied by surface obstructions. Outstanding examples of the latter are the Ford Motor Co. assembly plant, the right-of-way of Southern California Edison Co. containing high-tension wires, Los Angeles County Flood Control Channel and other similar leases and properties. Currently, operators at Huntington Beach are aggressively developing the Jones sand by directional drilling from upland locations roughly paralleling the shore line and located several hundred feet away from the tide line.

Cylinder drilling, which has been in use for some time, is rapidly growing in favor and will be used more extensively in future operations. This is particularly true of directionally drilled holes but some

operators even prepare cylinders of small dimensions when drilling straight holes. Where a directionally drilled hole may be given a 200-ft. diameter cylinder to work in, a straight-hole cylinder is usually restricted to 50 or 75 ft. A large part of drilling at Wilmington and Huntington Beach is done by contractors. Some contractors have become so proficient in drilling directionally controlled holes that they rarely fail to keep within prescribed bounds of the cylinder. Bits designed for wire-line coring operations are employed. The hole is usually surveyed with a single-shot survey instrument using wire-line retractable-coring equipment to determine the angle of drift and direction of inclination at regular intervals.

Contractors drilling directionally controlled holes at Wilmington and Huntington Beach usually carry from two to three points on the indicator with very little weight on the bit when drilling off a whipstock. There are no special drilling problems in either of these fields and usually two whipstocks are sufficient to keep the bit within limits of projected cylinders. In some cases three or four whipstocks may be used but this varies and in one well no whipstocks were required. Pump speed affects directional drilling to a great extent although considerable care is given to weight on the bit, rotary-table speed and other important factors including mud. A slow pump speed obviously reduces hydraulic action at the point of contact and the bit will, therefore, show increased cutting ability in the direction along which it has been started. Thus, a slow pump will increase the deviation or drift angle although weight on the bit and table speed are also important factors in keeping a hole within the confines of a prescribed cylinder. Whipstocks are employed only where necessary. Ordinarily pump pressure, rotary-table speed and weight carried on the bit when properly coordinated will almost always control the angle of drift.

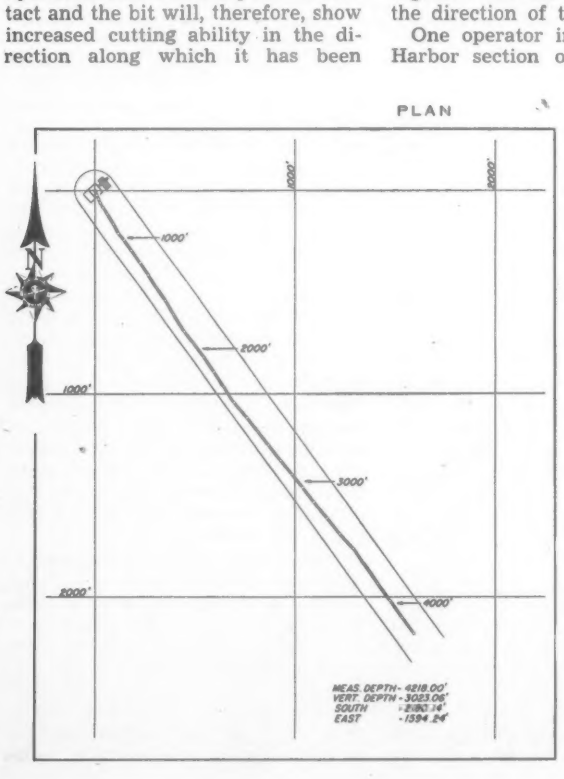
Operators Prepare Cylinders

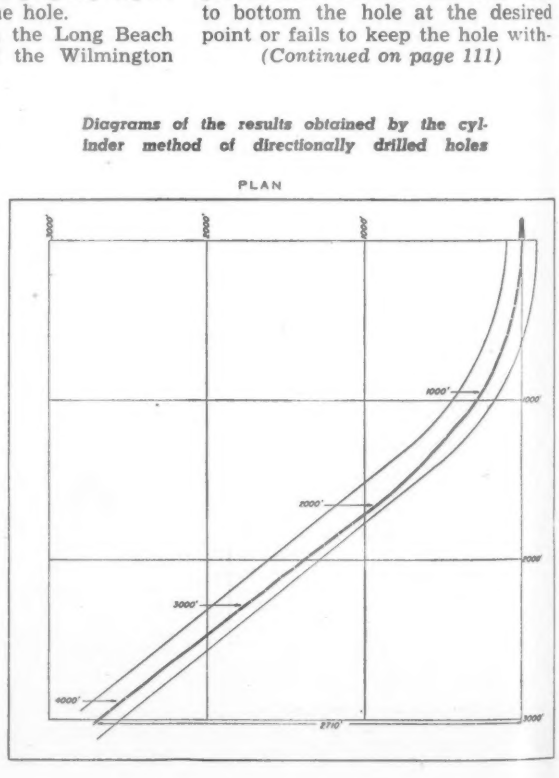
Most operators when drilling directionally controlled wells prepare cylinders for guidance of contractors and when this is not done the Eastman Oil Well Survey Co. prepares cylinders for its own purposes. The Eastman organization is a strong supporter of cylinder drilling which it has sponsored. Cylinder drilling is especially important in an area like Huntington Beach where there are several hundred directionally drilled wells all headed out into the tidelands. It is necessary to know the location of all directionally drilled wells in order to prevent a new project from damaging or piercing the casing of a producing well which in many cases is flowing naturally. By knowing the course of previously drilled holes, it is possible to prepare a cylinder course for new wells which will not interfere with its predecessors provided the drilling contractor stays within prescribed limits. The Eastman function is to take sufficient readings at regular intervals to properly report the direction of the hole.

One operator in the Long Beach Harbor section of the Wilmington field, when contracting wells to independent drilling firms, makes it obligatory for the contractor to make "a complete and accurate survey by the single-shot method as work progresses but in no event at intervals greater than 100 ft. apart." The contract also provides that "the contractor shall cause to be made a complete oriented survey to the bottom of the hole and such survey shall be made and computed from successive stations not more than 100 ft. apart." With respect to cylinder drilling, this operator requires all contractors to drill a hole "that shall at all times be confined to an area designated by the operator and shall be bottomed at a designated spot." A chart showing where the well is to be bottomed and the cylindrical course to be followed is made a part of each contract.

This operator is specific in requirements in order to definitely know the course taken by each well and stipulates that "the contractor shall at all times keep the hole within a radius of 50 ft. of the course designated for the path of the well and shall set whipstocks and take other proper steps to direct and control the course of drilling. The hole shall be directed in such a manner that any kink, sharp bend, or dog-leg in the hole shall not exceed 5 per cent for any consecutive 50 ft. or 7½ per cent for any consecutive 100 ft. of hole. Said kink, sharp bend, or dog-leg shall be measured by the vector system." Penalties are provided in case the contractor fails to bottom the hole at the desired point or fails to keep the hole with-

(Continued on page 111)





Diagrams of the results obtained by the cylinder method of directionally drilled holes

Factors Controlling Oil-Well Completions in the Illinois Basin

*by Carl A. Bays**

This is the second part of an article, the first part of which appeared in last week's issue. The author discusses practices followed in drilling in, shooting, and acidizing, multiple-zone completions, completion failure and workover jobs. He emphasizes the importance of making adequate observations of a geological and engineering nature during drilling, and the keeping of adequate records and measurements on wells, these being as essential to their successful drilling and completion as to their production.

DRILLING in may be accomplished with either cable tools or rotary. The greater part of this work in the Illinois basin has been done with cable tools, although rotary completions have been used with about the same degree of success by many operators. In most wells rotary pump pressure and heavy viscous muds have already been on the formation under pressure during coring, reaming, hole conditioning for and during pipe setting, and frequently also the cement slurry has been on the formation. Therefore drilling in with a rotary would seem to make little difference on a theoretical basis. A string of tubing is commonly used instead of drill pipe for drilling in. In practice it has been found that with good wells, results are about the same in drilling in with a rotary as with cable tools but the former is more rapid. In poorer wells it sometimes seems better to drill in with cable tools because of the pressure situation, but in most cases rotary tools will do as well.

Rotary drilling in. — Experience has shown that many of the difficulties attributed to drilling in with rotary tools are apparently not related to the system but to the choice of drilling-in fluid. When formations that were drilled with rotary mud are circulated with live oil for drilling-in fluid, a mud-oil gel may form that is probably forced back into the formation by pump pressure after the mud seal is broken. Drilling of the plug with rotary mud, on the other hand, should make little difference if the formation was properly mudded prior to setting pipe. The advisability of using clear water on Illinois basin formations is debatable. Some formations in some fields appear to react better to clear-water rotary drilling in than to any other method; they clean up in better shape and in less time. In other zones, particularly the limestones, clear-water drilling in and washing apparently forces considerable of the circulating fluid back into the formation and is generally unsatisfactory. The choice of rotary drilling-in fluid is thus a controlling factor in satisfactory results and the fluids used must be varied with the zone and field.

Cable-tool drilling in.—As stated cable-tool drilling in is the most common practice. This method is generally satisfactory in all of the pay zones in the basin. There are two drawbacks to this type of tailing in: (1) If it is desired to deepen below the existing bottom of the hole, the samples are less satisfactory for the determination of saturation and porosity conditions than rotary coring; (2) some cases of failure of cement thought to be due to jar of tools in drilling out the cement left in the pipe and drilling up the shoe are known. The first of these can be easily eliminated by the use of the cable-tool core barrel, cutting of short cores for analysis, and providing periods of testing during deepening. The second can be alleviated to some extent by leaving no more cement in the pipe than essential for safety, by spot-welding the lower joints of the casing string, and by using proper cementing techniques and equipment so that the cement sheath will be evenly distributed around centralized pipe.

Basis for tailing-in measurements.—Prior to tailing in it has been found a good practice to carefully determine for the tailing-in rig the zero point from which all the rotary measurements were taken. The writer has customarily done this by shooting with a hand level a temporary bench mark on a nearby tree or stake during drilling and also by recording footage of zero in relation to surface casinghead or bradenhead and then establishing the measurements for the drilling-in rig when moved in. When the shoe is drilled a further check with a steel line should be made to make certain that the pipe has been set as supposed. This can be done in rotary drilling in at any time but the exact position of the shoe can be determined by noting returns and drilling time during tailing in and measuring up inside the tailing-in string. Topping the shoe can usually be noted in the cable-tool rate of drilling as well, and fragments of the shoe are usually obvious in the cuttings. Several cases are known where the pipe-supporting device or tension-holding ring on the bradenhead has failed while cement was setting and prior to cutting off the pipe nipple above the head so that the pipe had slipped to a position across part or all of the pay section. The danger in not recognizing such a situation is obvious if accurate measurements are not taken; it can be easily corrected by pipe ripping or gun perforating where it has occurred.

Cleaning out to bottom.—After the plug is drilled, tools should be run to bottom with either rotary or cable tools. Careful check on the measurement should be kept so that no new formation is drilled unless desired but so the hole can be cleaned out to bottom. With rotary tools, washing down to bottom should take place immediately after drilling the shoe. It is preferable to attempt to wash in a well with a good gas drive by reversing circulation so that as soon as the hole is cleaned up circulation should be reversed. Experience has shown that wells which do not readily show a tendency to come in through the drill-pipe or tubing drill-in string should not be circulated unnecessarily but should be put on the swab at once. In cable-tool work, after the plug is drilled, cleaning out to bottom should be carefully done with a sand pump and tools.

Gun-perforating completions. — Another type of tailing-in and completion procedure which is common practice is the setting of pipe through the pay zone and gun perforating for completion. In the Illinois basin, considerable differences of opinion exist as to the merits of open-hole and gun-perforation completions. Since many of the sands

*Geologist and engineer, Oil and Gas Division, Illinois Geological Survey. Published with permission of the chief, Illinois State Geological Survey, Urbana.

do not readily produce oil without shooting, gun perforating is not possible in these cases. In a number of zones, such as those where it is necessary to squeeze the basal portion of an oil and water-bearing section, gun perforation is the only practical method of completion. In some of the Wabash Valley fields in certain sands, particularly the Waltersburg and Cypress where the reservoir energy is high, open-hole and gun-perforation completions apparently have equal merit where the sands are of such quality as to justify production natural (without shooting). In McClosky and Devonian zones with high reservoir energy it is the writer's opinion that gun-perforation completions are more successful because they permit the ready production of a number of thin zones and because, as is pointed out below, acidizing is more efficient in following channels set up by gun perforating directly into the pay. In multiple-zone wells gun perforation is apparently as efficient as any other method of completion except where shooting is necessary and sufficient thickness of sand permits the setting of alloy windows, their removal and the setting of a shot. Some producers contend that as high or higher ultimate recoveries and more efficient production are obtained even in zones normally shot with glycerine by production through gun perforations.

Completion by ripping or slotting.—There are methods of ripping and slotting the oil-string pipe which are suitable for the same methods of completion as gun perforating. Some of these are not as efficient as gun perforating because they do not penetrate the pipe, the cement sheath, the mud cake, and into the formation, while others apparently serve as well. These are not widely used in the Illinois basin.

Completion with alloy pipe.—Another type of completion commonly used, more normally in multiple-zone wells but also in single-zone sand wells, is the setting of alloy pipe across the pay and obtaining production by its removal after cement has set. The alloy is removed in several different ways. If a rotary completion is used, the well is normally brought in by removal of alloy with a rotary scraping or milling tool which reams alloy, cement, mud sheath and formation face to large diameter; after washing, circulation is normally reversed and the well washed in or the well is swabbed in if it will not flow. Where cable tools are used a standard ripper or reamer or variations thereof are commonly used to remove the alloy. In some wells the alloys may be largely removed or destroyed by use of special gun-perforating bullets or by use of bullets to partly open pipe followed by shooting so that shot caving and alloys are cleaned out together after shooting. In some wells alloys which can be removed by acid or shooting have been used with considerable success. In general such alloys, removable by acid or shooting, are not stable and are unsuited for leaving in the presence of salt water or on zones which it is not desired to produce immediately. Other alloys of a more stable character are available and are commonly used to case off zones intended for production at a much later date. The use of alloys in the oil string necessitates more than normal care in handling and setting of pipe. Several cases are known where alloys may have failed under intensive casing swabbing, particularly in unloading pump-down fluid from the hole after cementing.

Many operators treat their regular seamless casing much as alloy pipe is used, ripping, setting shots, and cleaning out in sand zones. Of course, the seamless pipe is more difficult to clean out and less convenient than alloy pipe.

Swabbing.—Any well in the Illinois basin, with only a few possible exceptions where extreme caution is dictated by proxmity to water-bearing strata, should be swabbed extensively before being put on production. In general, casing swabbing is much more satisfactory than tubing swabbing. As a normal rule, after the well is cleaned out to bottom, the casing swab and sand pump should be rigged up. The well should be alternately swabbed and sand pumped for several days so that all drilling mud materials are removed from the formation and as many flow channels as possible are opened up while the initial flush and gas energy are available to aid.

Accurate swabbing records should be kept because they guide decisions in later completion (Fig. 7). Where possible it is advisable to swab into the tanks. Where tanks are not yet built, pits should have been emptied by the mud pump after setting pipe. By swabbing into pits which have been measured and in which a marked stake is set to indicate depth of fluid, a fair estimate of swab recovery may be made, although differentiation of mud, oil, and water is not possible unless a tank thief is used. A record indicating time into hole, top of fluid, feet of fluid pulled, time out of hole, for each trip of the swab gives an accurate record of the fill up and yield of swell during swabbing. Several days of swabbing on any well which does not have a strong gas drive will usually show benefit because fluid levels and rates of production normally show some increase as the well is cleaned up; however, in high gas-drive wells the decline in flush gas and reservoir energy frequently offsets this effect. As swabbing progresses in low-fluid-level wells, it may be advisable to shut down swabbing operations for short periods in order to allow periods of fill-up so as to give a more accurate gage. In other wells an effort should be made to have swabbing continuous. All of these matters should appear on a carefully kept swab record; it is not usual practice to keep such a record but it has been found to be extremely helpful. The decision to shoot, acidize, use chemical treatments, etc., to increase production should be based on an anlysis of the performance of a well natural on a swabbing test, and on the performance of wells in the same reservoir or in fields with similar situations as to porosity, permeability, oil and water conditions, gas or water-drive, and other factors that govern well behavior under both natural and shot.

SWAB RECORD

Date: **Oct. 12, 1940**

Operator: **Jones** Farm: **H. Fox** Well No.: **3**
Location: **SE SE SE** Sec. **3**, T. **15s**, R. **11e**, **Wayne** County, **Illinois**
Contractor: **Smith** Driller: **Doe** Tool Dresser: **Brown**
Formation: **McClosky** T.D.: **3,492** Casing Diameter: **7 in.**

Time into hole	Top of fluid	Ft. fluid pulled on trip	Time out of hole	Approx. per cent Oil	Approx. per cent Water	Remarks
10:16 a.m.	2,650	400	10:37 a.m.	95	5	850 ft. fillup since plug drilled at 8:50 a.m.
10:40 a.m.	2,790	350	11:03 a.m.	98	2	About 1 bbl. b.s.
11:04 a.m.	2,810	400	11:21 a.m.	98	2	Net gage oil swabbed to tanks 1st hour 41.66 bbl.
11:27 a.m.	2,800	400	11:48 a.m.	99	1	2 bbl. b.s. to pits
			Shut down to fix valve on swab for hour and half. Well flowed two heads and gassed a lot.			
1:20 p.m.	2,430	400	1:45 p.m.	98	2	
1:50 p.m.	2,500	400	2:03 p.m.	98	2	Flowed small head after swab up.

Fig. 7: Swab record form, partially filled out from records of one well in Illinois basin

acidized, chemically treated, etc., conditions.

Shooting

If it is desirable to shoot a sand, it is probably better to do so early in the life of the well while the flush energy can aid in establishing formation flow channels. It some wells it has been found that the tamping and cleaning out are as important as the actual shooting.

Normal shooting procedure. — In the Illinois basin the shot is usually set in a cylindrical cartridge with time bomb and covered with tamped sand, screened pea-gravel, or patented quick-set cement. After the shot goes off, the well is cleaned out to bottom, usually with tools and sand pump. Most wells are then swabbed and sand pumped till caving stops and are then put on production. Generally shots are of uniform intensify but some operators do selective shooting, use core-analyses or electric-log permeabilities to place heavier loads opposite less permeable zones.

Tamping material.—The choice of tamping material is varied with the conditions and the customs of the various operators. In some holes the patented cements have not set, while in others they have given the most satisfactory results in protecting pipe. They are also most readily cleaned out. Either sand or pea gravel should be washed into the hole with water until the shot is well covered. Washing should then be alternated with tamping. Care should be taken that the sand or gravel does not bridge up the hole above the shot. With either sand or gravel, a sufficient period of time after the shot has gone off should be allowed for settling before cleaning out is started.

Factors controlling effectiveness of shooting.—The size of shots must be based on experience. In spite of common opinion few cases of actual "burning" or fusing of the sand face by heavy shooting are known. Shooting does not always improve wells, however, due to the following conditions:

1. Lack of proper cleaning out prior to shooting so that rotary mud, suspended materials, etc., were driven back into the formation by the shot.

2. Shooting with too large a shot so that the formation was pulverized, the small particles making an effective seal of the producing face.

3. Lack of proper cleaning out after shooting, including lack of sufficient swabbing and sand pumping to withdraw all fine particles in suspension in the oil or water into the bottom of the hole where it can be removed.

4. Lack of sufficient swabbing after shooting to start fluid which was driven away from the hole back into the hole or to assist development of flow channels. It seems apparent from study of behavior in adjacent wells that when a shot is set off and relief is prevented upward in the hole by an effective seal of sand or gravel and fluid or cement that the gases and force of the concussion cause a surge of the fluids in the reservoir away from the hole. This is often noted in closely spaced offset wells. Then after a cleaning out, the fluids cannot be or are not drawn back toward the hole.

The first three of the above conditions may be eliminated by the obvious methods of sufficient cleaning out or adjusting the size of the shot.

Uncovered shooting.—A modification of the normal shooting technique has been found helpful in eliminating the last condition above. This is the use of smaller shots and shooting in open hole without cover other than a hole full of fluid so that after a short settling time, swabbing and cleaning out may be started immediately. Where a surge of fluid away from the hole may be set up in the reservoir, it is established that there is probably a reversal of this surge at some time shortly after. When it is possible to take advantage of such a returning surge with the casing swab, the well gives higher recoveries. Thus it is often possible to use a 5 to 10-qt. open-hole shot with as good or better results than a 50 or 60-qt. tamped shot; the cost is also lower because it takes less rig time. A few comparative results have shown this method of shooting to be more efficient in low fluid level and smaller wells, but too few operators have used this technique to permit a conclusive comparison.

Dump shots. — Dump shots are used in some zones and in some fields. The shots are usually of such size as to fill a cavity made by a previous shot. They are commonly covered with several yards of sand or gravel or with the special cement. Shots up to 700 qt. have been used successfully with this method In the Aux Vases sand in several fields where pipe has been set in local calcareous tight spots in the reservoir, noncommercial wells have been converted into good producers by use of large-size dump shots. In other wells greatly increased yields have been obtained by large-size dump shots. In others, no noticeable effect was obtained by large-size shots. There is a serious need in the Illinois basin for a careful study of the results of shooting with regard to costs, results in yields, and determination of proper technique for the varying reservoir conditions.

Open formation shooting with gun perforator.—A practice which has

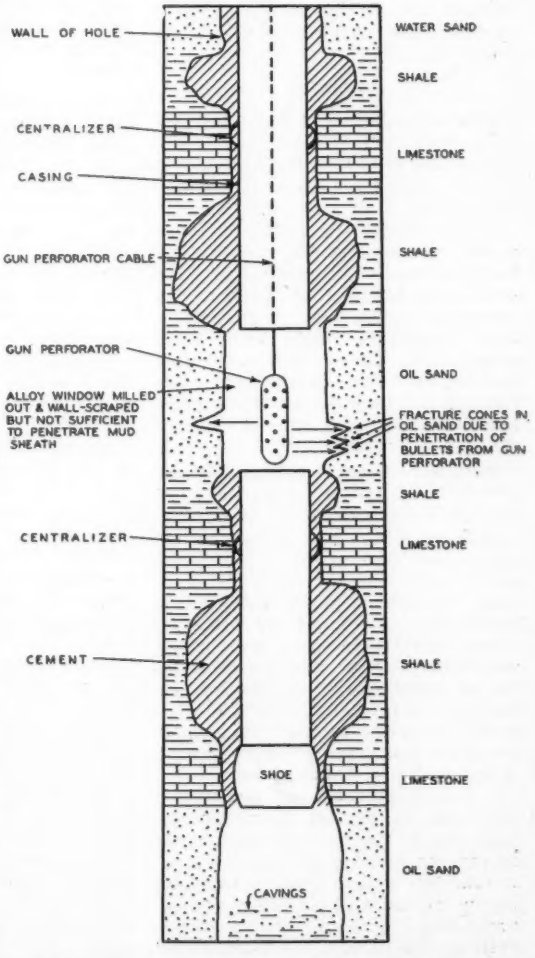


Fig. 8: Diagram showing operation of gun perforator in open hole. This well is to be a dual completion. Shooting the upper sand might damage pipe, so after wall scraping the alloy and wall, a gun perforator is used to develop the upper sand. The lower sand is shot in the regular way

been successful in some wells and not in others is open-hole gun perforating of the producing formation instead of shooting (Fig. 8). It has been substituted for shooting in a few wells where pipe might be damaged by glycerine shots, and it has been used when cleaning out a few wells after they were on production. Increases resulted but how much was due to cleaning out and how much to formation shooting with the gun perforator is problematical. However, higher fluid levels and considerable caving with each shot were noted. In a very few wells the gun perforator has been used to shoot a pay in open hole instead of glycerine shooting. An increase over the natural swab yields was noted in each case. Considering the results obtained in these few wells and the results obtained from producing wells through perforated casing in which the only openings for production in casing, cement sheath, and formation are those from gun-perforated bullets, this method should be given serious consideration as a completion technique and aid.

Acidizing

The calcareous and dolomite pay zones in the Illinois basin are usually acidized either during completion or after they have been on production a while. In most wells, acidization is highly successful. In some zones, in some wells, acidization has not been successful, or has even been detrimental to the wells; improper techniques or improper acid compounds might have been responsible. There are two usual techniques for acidizing, one through the tubing, with or without a packer on tubing, and the other, through the casing.

Acidized through tubing.—When a well is acidized through the tubing the open end of the tubing or a perforated nipple is spotted at the pay zone. The hole is filled with oil or water and the casing head is shut. The acid is pumped down the tubing and into whatever place of easiest relief there may be if pressure builds up, or into the zone of easiest reaction if no pressure is built up. The volume of acid is displaced from the tubing with an oil or water flush. After displacement of the acid, sometimes a short waiting period is observed or tubing swabbing is started immediately. After swabbing for sufficient time to recover most of the acid water, to start the well to flow, or to clean up the oil, the well is usually put on production. Most of the limestone wells in the Illinois basin are completed in this manner.

Acidizing through tubing with packer. — Another common procedure is to acidize through the tubing but with an anchor, ring-wall, or other packer set on the tubing just above the pay zone, or if it is a perforated zone in a multiple pay well, above and below the treated pay zone. This method has two advantages over the preceding in that there is somewhat better control of the direction of the acid, thereby giving a more efficient reaction in many wells, and because of the smaller volume drawn against it, makes tubing swabbing much more effective in creating suction on the formation.

Acidizing through casing. — The third normal acidizing procedure is to acidize through the casing. A short tubing nipple is run through the casing head. The acid, followed immediately by the flush to displace it from the casing, is pumped down the casing. After the acid has reached the formation and has been completely displaced from the pipe, the casing is swabbed until the acid water is recovered and the well is ready for production. This method has the obvious advantage of permitting casing swabbing instead of tubing swabbing with or without a packer.

Special conditions governing acidizing techniques.—Special modifications of these techniques are suitable for different limestone zones in different fields. For example, many of the producing zones have an insoluble residue content of clay and silt of considerable amount. When the limestone is dissolved, clays and silts and partly dissolved calcite or dolomite crystals are in suspension in the spent acid. If they remain static, a gel may form which has a sealing effect. This is particularly true where the paraffin content of the oil is rather high. In such circumstances it is desirable to remove all acid water from the hole and to start oil moving into the new flow channels as readily as possible after the acid is spent. This can be done efficiently only with a casing swab. In such conditions, the writer has had best results by beginning continuous casing swabbing within 2 hours after the acid reaches formation. The displacement of the oil in the formation apparently causes the movement of some fluid in the reservoir away from the hole. A natural surge back toward the hole from this displacement probably takes place, and if with this surge, active casing swabbing is in progress and the spent acid water is removed from the formation, a more efficient acidizing job will result.

Acidizing in perforated zones.—Where pay zones are thin, it has been found that completion by perforations is the most efficient way of controlling the acidizing. Acid has more tendency to react with the unsaturated zones than with saturated zones. Where there are thick inter-pay limestones with thin or separated pay zones in open hole, the acidizing by any of the three normal techniques usually dissolves the inter-pay strata with little of the acid actually entering the pay zones. Where casing is set through such a section and each thin zone is perforated, the perforations form guide channels along which the acid enters the formation and a much more efficient acidizing job results. Statistical studies generally indicate that completion of McClosky limestone wells in the Illinois basin by perforating and acidizing may be expected to give the highest ultimate recoveries. Of course, there are exceptions to this generalization because of the many variables that must be considered.

Acidizing jet gun.—Another method for treating thin pays or treating in open hole where deepening has taken place is the use of the acid jet gun. In wells where there are thin pay zones, the position of which is exactly known and which are separated by larger thicknesses of unsaturated limestone or dolomite, where desired to produce in open hole, the jet gun directing acid into the producing zone has been found very effective. The jet gun is also used in such wells with a packer run on the tubing string above or below or both to separate the zone being treated from zones above or below. This practice is usual in wells where a sand and a lime pay are to be produced together and excellent results are frequently obtained. The widest use of the acid jet gun has been in treating zones opened by deeper drilling of existing wells. In the earlier development in the Illinois basin, few wells were carried much below the first limestone producing horizon. Many McClosky wells have since been deepened to lower McClosky, St. Louis, and Salem zones with cable tools, as commonly there are no water-producing zones between these pays. Wells with several limestone producing horizons and several hundred feet of open hole are not uncommon. These lower pays are usually treated with the jet gun.

Some special acidizing techniques. —There are a number of other variations that may be used to fit particular conditions governing acid treatment. In some wells, partial treatments may be desirable, and commercial gels can be used to protect the portion of the formation not needing treatment. In others, acid-soluble cement has been used in squeeze jobs with jet-gun treatment to remove the cement on the desired portions of the formation and to treat at the same time. Special acid treatments for sand formations or calcareous sandstones are desirable in some wells.

Factors controlling acidization.—As stated, most of the acid treatments in the Illinois basin are successful but many variables must be considered. An anlysis of a core from the pay zone plus some knowledge of the character of the oil is helpful in deciding on the best acidizing technique. The physical properties of the reservoir, the permeability of the zone as determined from the electric log and core analysis, plus the carbonate and oil character of the pay all should be considered in deciding on the type of acid, its surface tension, and the inhibitor best suited for the particular acidization. As many of these things as possible should be known before setting pipe so that the type of completion may be determined at that time. It is thus evident that core-analysis, electric-logging, samples of oil from drill-stem testing, etc., all have important bearing on the completion of a limestone producer. The principle that has been least followed is that spent-acid water standing on a producing formation or occupying the pore spaces in it can do little good and its quick removal is desirable.

Multiple-Zone Completions

With the war the emphasis has been placed on higher recoveries and higher yields in relation to the amount of steel used. This is bringing about a greater number of deeper exploratory tests in the Illinois basin, wildcats designed to find all of the producing zones in an area and intended to be completed in more than one zone or designed to be used for the production of one pay after another is exhausted. Either method of production is consistent with the war effort. If sufficient work is done with the drill-stem tester, core analysis, electric log, etc., during drilling to prove the potentialities of all zones, it is more desirable to produce from a single zone at a time. This method proves the reserves for later needs and avoids the complexities of multizone completion and production.

Methods of multizone completions.—Nearly all of the methods of completing multiple-zone wells have been mentioned elsewhere in this paper. They include:

1. Use of alloy pipe opposite pay zones in the casing string and removal of that pipe for production by ripping, gun perforating, shooting, acidizing, milling, or combinations thereof.

2. Setting of seamless pipe and ripping with or without shooting, slotting, gun perforating, or milling this pipe.

3. Combinations of either of the above with setting pipe on top of the lowest pay so that it is produced in open hole.

4. A newer method, not previously discussed is setting the pipe sectionally and cementing with special tools so that open hole is left opposite the pay zones.

Any of these methods are satisfactory for use with certain pays but some of them are restricted in their usage depending on conditions in various pay zones and fields. The choice of method for setting pipe is governed by the production characteristics of the zones involved and by the necessity for shooting, acidizing, etc., that may be determined.

Some factors of importance in multizone completions.—Certain cautions are more necessary in multizone completions than elsewhere. Cement jobs are of great importance and the knowledge that cement has reached the desired point behind the pipe is imperative. This necessitates the careful control of drilling mud, caliper and temperature surveys to guide and check cementing, and accurately kept records and measurements during drilling and pipe setting. It is highly desirable to test the pays in multizone wells separately and this necessitates the use of tubing and packer, bridging plugs, or retainers to separate the pays while testing or treating is in progress. Accurate swabbing tests of each pay and the keeping of accurate swabbing records are desirable as a guide in the production characteristics of the multizone well. Some concessions in efficiency to separate zone or open-hole single-zone production are sometimes necessary, as for instance in wells where shooting is impossible although desirable. In such wells, special substitutes such as open-formation gun perforation are desirable. Careful observation of multizone wells on production is necessary to guide completions and to determine which horizons may be successfully produced together and which may not in any one field. Frequent observations of fluid levels during production are a great aid in determining the handling of a well and in modifying completion practices on future wells.

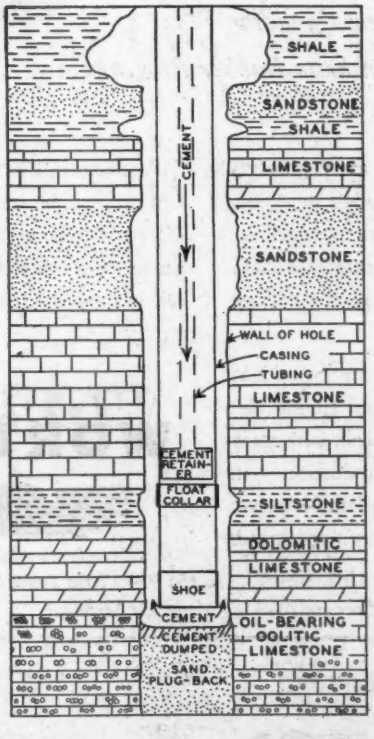


Fig. 9: Diagram showing method of using sand to plug back opposite the pay zone for squeeze job to shut off water coming from behind casing

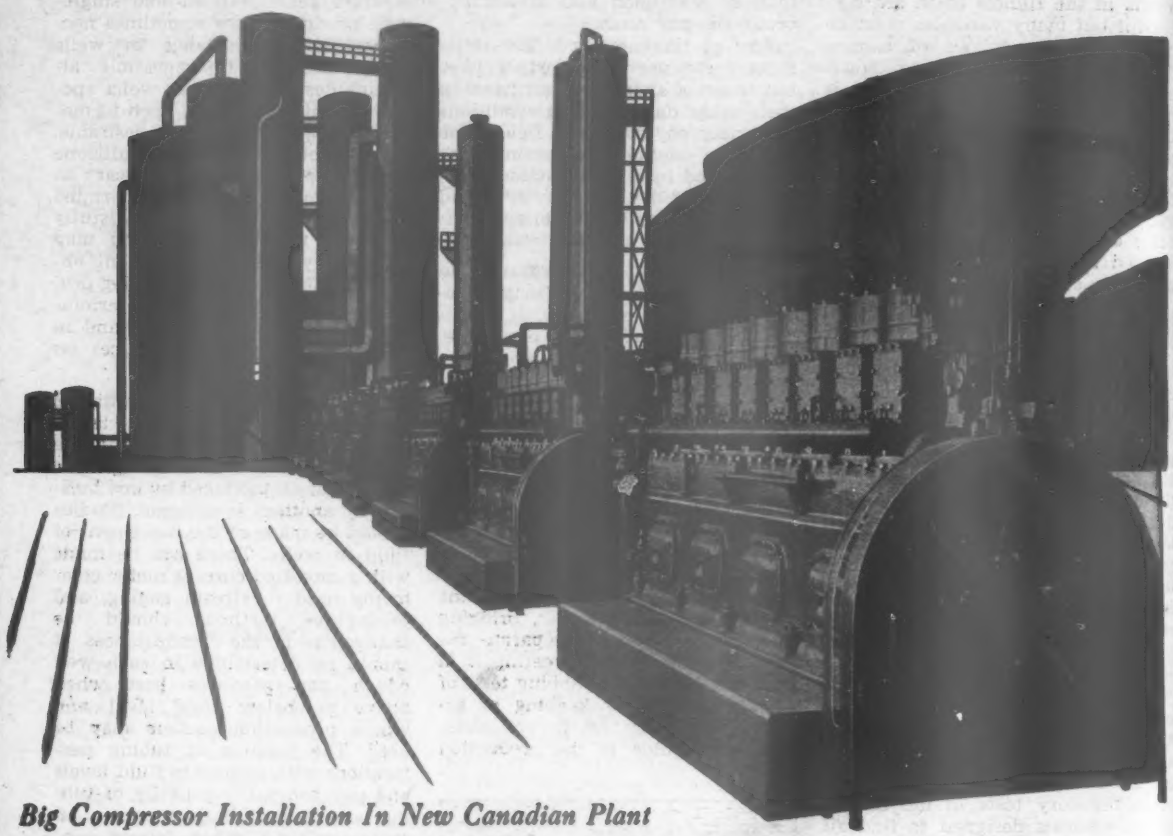
Producing aspects of multizone wells.—The producing aspects of wells producing from more than one horizon are many. "Thieving," the stealing of oil produced by one horizon by another, is common. Studies should be made of the movement of fluid in wells. These can be made with a modified current meter commonly used in stream gaging, and production methods should be changed to fit the circumstances. It should be determined in each well which pay produces best when above or below fluid level and where production packers may be used. The position of tubing perforations with respect to fluid levels and pay zones, the capacity of tubing and pump, back pressure on separator, and other factors controlling production must be changed during production because there is a decline in energy of gas or water drives. Careful observations of these matters, the fluid levels, production rate, and their interpretation in terms of the characteristics of the producing horizon and completion history are essential to the most efficient results from multizone completions.

Completion Failure and Workover Jobs

It is common that there are failures in completions or that wells are worked over to increase or modify production conditions. It is not intended to go into these matters in detail but a few of the factors governing these matters are pointed out.

Squeeze jobs.—Frequently it is desired to squeeze cement a well, either to shut off water coming from back of the pipe, or shut off a portion or all of a porous zone. As a general rule, cement will not set on the saturated portion of a producing horizon, but in the lower pressure formations of the Illinois basin, especially where water has been standing on the face of a pay zone, cement under pressure will set up. Where it is desired to produce a

FROM PRODUCTION TO POLYMERIZATION



Big Compressor Installation In New Canadian Plant Typifies Worthington's Part In Synthetic Rubber Program

Nine Worthington LFC-type angle gas engine gas compressors are now at work in Canada's new government-owned synthetic rubber plant operated by Polymer Corporation, Ltd. Similar machines have been installed in two identical U. S. plants, making synthetic rubber by the same process.

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zone after the casing seat has been squeezed, it is better to plug the pay off effectively or to use acid-soluble cement for squeezing so that the pay may be readily uncovered. The most efficient plug-back found by this writer was to use sand to cover the formation and dump a sack or two of commercial or gypsum cement on top of the sand plug and allow it to set before squeezing (Fig. 9), or to use easily drilled gypsum cement for the entire plug. With the latter method care should be taken that hole conditions are proper to allow this cement to set firmly.

Reshooting.—Frequently it is desired to reshoot a well on production in hopes of increasing the production rate. In some wells this is successful and in some the apparent yield increases are possible due to the cleaning out usually associated with reshooting. Careful observation of working over is essential to justify the expense of reshooting. As pointed out, some operators let their shooting go until a well has been on production for some time. This may be desirable in discovery or early wells in a new pool so as to furnish a basis for determining the aid received by shooting; however, more efficient results from shooting are usually obtained by shooting early in its history while reservoir energy is at its maximum. Reshooting can be of aid in cleaning out the well and cleaning up the face of the sand while being reworked. In some cases chemical treatments designed to do this may prove more effective.

Reacidizing.—It is frequently desired by many operators to acidize a well after it has been on production for some time or to reacidize or stage-treat a well. As in the case of shooting, acidization is more desirable early in a well's history when reservoir energy is at its maximum. Care should be taken that when a well is reacidized the volume of acid in the new treatment is followed not only by sufficient flush to displace it from the tubing or casing but also a volume of flush equal to the previous treatments so that it will reach untreated zones. Quick removal of spent acid water is even more desirable on wells in which the reservoir energy is reduced than on new wells as there is less drive to expel the fluids and more possibility of acid-paraffin gels or emulsions sealing the formations.

Factors meriting consideration before working over.—Most operators are familiar with wells where because of poor completion techniques, lack of sufficient information to justify setting pipe, lack of commercial pay, or because of poorly understood or accidental conditions large sums have been expended in attempting completions, reworking, squeezing, etc., where on more mature consideration the wells would have been better abandoned without such attempted completions or recompletions. When a water well is encountered, the conditions surrounding it should be carefully analyzed. A recheck of measurements, evidence justifying setting of pipe, records of the well's performance and behavior to that point, its geological position with respect to structure, etc., should be undertaken immediately. Analyses of the water should be made to determine whether its source may be recognized by its chemical character. Swabbing tests to determine whether water may not be exhausted as is common in some zones in some fields should be run. Electric-eye turbidity surveys or other studies can be run to determine, if possible, where water is entering hole. The possibilities of drilling deeper to find another pay zone should be evaluated. When these considerations are made, the advisability of reworking, squeezing, abandoning, or drilling deeper can be determined. The need of adequate records for such wells is obvious.

Conclusions

The factors governing well completion in the Illinois basin are variable with the field and producing zone or zones. A number of special techniques have been developed so that any particular conditions may be met. A number of tools and instruments are available for the determination of the conditions and for guidance or use in well completion.

Proper care in drilling, setting pipe, tailing in, acidizing, and shooting will normally result in successful completions. The making of adequate observations of a geological and engineering nature during drilling and completion and the keeping of adequate records and measurements on wells are as essential to their successful drilling and completion as to their production. Such records will form a sound basis for future secondary-recovery operations. Most of the observations and practices that are of aid to the geologist or should be followed by him are also of benefit to the engineer and the production man. There are a number of things that must be done by the geologist in order to assure adequate records, complete information, and satisfactory well conditions for completion just as there is considerable information concerning completion and production behavior of producing zones that should be available to and be understood by the geologist in order to make his recommendations valid.

Acknowledgments

The writer gratefully acknowledges the contributions of many operators, producers, former clients, and employes of both service and producing companies for ideas and experiences included in this discussion. He is particularly grateful for the fine cooperation of the many oilfield "hands" in both drilling and production who have made his completion work a pleasure and have provided much of the data and many of the observations incorporated in the paper. Thanks are also due Dr. M. M. Leighton, chief, Dr. A. H. Bell, geologist and head of the Oil and Gas Division, and other members of the staff of the Illinois Geological Survey for constructive criticisms and counsel in preparation of the manuscript.

BOOKS

A HISTORY OF THE NAVAL PETROLEUM RESERVES AND OF THE DEVELOPMENT OF THE PRESENT NATIONAL POLICY RESPECTING THEM. By Reginald W. Ragland, Richfield Oil Corp., Los Angeles. 180 pp.

In this volume the author has attempted to organize and fairly present in orderly sequence, source material evidencing matters of historical fact which constituted the background of the Naval Petroleum Reserves and which led to their creation and to the laws relating to them, and, from those facts and from subsequent events, to trace the development of the present national policy respecting the reserves. The four Naval Petroleum Reserves, as oil fields and as "reserves" are described as they are today, and recent events which have directed attention to them are briefly reviewed.

PRACTICAL DESIGN FOR ARC WELDING. Vol. 1. By Robert Kinkead. Published by The Hobart Brothers Co., Troy, Ohio. $3.50.

This is the first of three volumes to be published, and provides a practical working book for the welder, manufacturer, engineer, and designer. It is not a text book, but an illustrated storehouse of information and detailed drawings showing how tubing, plate sheet, standard steel sections, angles and bars can be used to fabricate products with arc welding. A complete work sheet in graph form is shown opposite each design plate. On these work sheets can be made notes, estimates and sketches as the design plate relates to the projected design. All design plates are clearly marked with the fundamental welding symbols of the American Welding Society and welding symbols are illustrated and fully described on a separate page in front of the book.

ENGINEERING PAPERS, FOURTH ANNUAL CONTEST 1944. Published by Hydraulic Institute, 90 West Street, New York. $1.50.

This publication is the outgrowth of the institute's contests, held annually, to encourage the employes of its members to contribute something of value to the industry in theory, design, or practical application of pumps. It contains five papers: "Special Operating Conditions of Centrifugal Pumps," "A Common Language for Hydraulic Engineers," "Critical Speed," "Direct-Acting Steam Pumps," and "Effect of Entrained or Dissolved Gas on Rotary Pump Performance."

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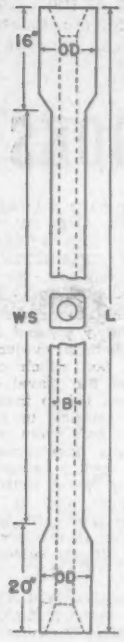

IDEAL SQUARE ALLOY STEEL ROTARY DRILL STEMS

Size Square, Inches	WS Working Space, Feet	L Length Overall, Feet	API JOINT Top L.H. Box, Inch	API JOINT Bottom R.H. Box or R.H. Pin, Inch	O.D. OF UPSET Top, Inch	O.D. OF UPSET Bottom, Inch	B Bore, Inch	Approx. Weight, Lbs.	For Each Additional Foot Add Lbs.
3	27 38	30 41	6⅝ Reg. or 4½ Reg.	2⅞ Reg. 2⅜ Reg.	7¾ or 5½	3¼	1⅝	784 1043	23½
3½	27 38	30 41	6⅝ Reg. or 4½ Reg.	3½ Reg. 3½ F.H.	7¾ or 5½	4⅝	2	1008 1349	31
4¼	38 38 51 51	41 41 54 54	6⅝ Reg. 6⅝ Reg. 6⅝ Reg. 6⅝ Reg.	4½ Reg. 4½ F.H. 4½ Reg. 4½ F.H.	7¾	5½ 5¾ 5½ 5¾	2⅜	2008 2008 2593 2593	45
5¼	38 38 51 51	41 41 54 54	6⅝ Reg. 6⅝ Reg. 6⅝ Reg. 6⅝ Reg.	4½ Reg. 4½ F.H. 4½ Reg. 4½ F.H.	7¾	5½ 5¾ 5½ 5¾	3	2917 2917 3827 3827	70
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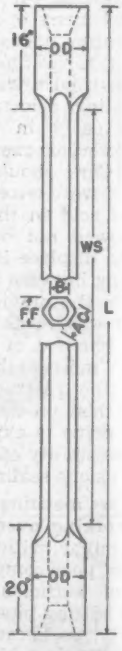

IDEAL API HEXAGON ALLOY STEEL ROTARY DRILL STEMS

Nominal Size, Inch	L Length Overall, Feet	API JOINT Top L.H. Box, Inch	API JOINT Bottom R.H. Box, or Pin	WS Working Space, Feet	FF Face to Face, Inch	AC Across Corners, Inch	OD O.D. OF UPSET Top, Inch	OD O.D. OF UPSET Bottom, Inch	B Bore, Inch	Wt., Lbs.	Approx. Wt. per Ft., Lbs.
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*4⅛	41 41 54 54	6⅝ Reg.	4½ Reg. 4½ F.H. 4½ Reg. 4½ F.H.	38 38 51 51	4¼	4 H	7¾	5½, 5¾ 5¾ 5½, 5¾ 5¾	2¼ Reg. 2¼ F.H. 2¼ Reg. 2¼ F.H.	1880 1530 2432 1970	42½
†4⅜	41 41 54 54	6⅝ Reg.	4½ Reg. 4½ F.H. 4½ Reg. 4½ F.H.	38 38 51 51	4.847	5⅛	7¾	5½, 5¾ 5¾ 5½, 5¾ 5¾	2¼ Reg. 2¼ F.H. 2¼ Reg. 2¼ F.H.	2400 2049 3120 2658	56
*5⅛	41 41 54 54	6⅝ Reg.	5 7/16 Reg. 5 7/16 F.H. 5 7/16 Reg. 5 7/16 F.H.	38 38 51 51	5¼	5 H	7¾	6¾ 7, 6¾ 6¾ 7, 6¾	2¾ Reg. 3½ F.H. 2¾ Reg. 3½ F.H.	2772 2259 3600 3024	64
†5 7/16	41 41 54 54	6⅝ Reg.	5 7/16 Reg. 5 7/16 F.H. 5 7/16 Reg. 5 7/16 F.H.	38 38 51 51	5.946	6¼	7¾	6¾ 7, 6¾ 6¾ 7, 6¾	2¾ Reg. 3½ F.H. 2¾ Reg. 3½ F.H.	3517 3004 4604 4028	83
*6	41 41 54 54	6⅝ Reg.	6⅝ Reg. 6⅝ F.H. 6⅝ Reg. 6⅝ F.H.	38 38 51 51	6	6 H	7¾ 8, 7¾ 7¾ 8, 7¾	7¾ 8, 7¾ 7¾ 8, 7¾	3½ Reg. 4½ F.H. 3½ Reg. 4½ F.H.	3467 2830 4530 3700	83
†6⅝	41 41 54 54	6⅝ Reg.	6⅝ Reg. 6⅝ F.H. 6⅝ Reg. 6⅝ F.H.	38 38 51 51	6.846	7¼	7¾	7¾ 8, 7¾ 7¾ 8, 7¾	3½ Reg. 4½ F.H. 3½ Reg. 4½ F.H.	4337 3701 5703 4865	105

*Present proposed API Standards.
†Former proposed API Standards.
7⅞" sizes upon application.
Unless otherwise specified, hexagon drill stems will be furnished with 6⅝" API regular tool joint left hand box upper end. Each size stem will be furnished with corresponding API size regular right hand tool joint box or pin on lower end when regular bore is specified. If full hole bore is specified, either regular tool joint box or full hole tool joint pin or box will be furnished. Information on OCTAGON DRILL STEMS sent upon request.

PRACTICAL REFINERY ENGINEERING

No. 13—Pressure Drop—Shell Side of Tubular Heat Exchangers

by Paul Buthod and B. W. Whiteley

Discussion of fluid pressure drop through tubular heat exchanger shells in this article includes leakage between baffles and shell and through tube holes. How the accompanying charts are used in calculating shell pressure drops is illustrated in two practical examples.

FLUID pressure drop through the shell side of tubular heat exchangers is of prime importance both in design and operation of equipment. Allowable pressure loss through a heat exchanger is very often the factor which limits heat transfer rates.

Calculation of the shell-side pressure drop is complicated by a number of factors which vary according to the particular design and method of fabrication used by the manufacturer.

For fluids flowing through the shell side of tubular heat exchangers equipped with transverse or crossflow baffles, the pressure loss can be fairly well correlated by means of a modified form of the Fanning equation (1):

$$(1) \qquad \Delta P = 0.0303\, f\, s\, u^2\, N^{0.5}\, B$$

where the symbols are explained in the accompanying notation. The friction factor "f" is in general a function of the dimensionless term $(d_e G_p/z_s)$. Consequently, data on commercial installations can be correlated by means of a logarithmic plot of "f" vs. $(d_e G_p/z_s)$. The equivalent linear velocity term "u" in Equation 1 cannot be calculated directly since the area of the passageway, through which the fluid flows, varies from point to point. Leakage between the baffle and shell, and through the tube holes must also be taken into consideration.

Therefore the "u" term is calculated indirectly by means of the shell-side mass velocity, G_p, which takes both of the foregoing factors into account. The equivalent linear velocity can then be determined by means of the relation:

$$(2) \qquad u = G_p/224{,}640\, s$$

In order to allow for entrance and exit losses, the baffle factor "B," should be taken as the actual number of baffles plus 3.0 for a single shell pass. For a two-pass shell, the baffle factor is equal to the actual number of baffles in both passes plus 4.0.

Calculation of the shell-side mass-velocity term, which is used for obtaining both the friction factor and equivalent linear velocity, is usually somewhat tedious. The following equation is used for a single-pass shell:

$$(3) \qquad (G_p = W/(A_1 - A_2 + A_4 + A_5)$$

where

$A_1 = b\, d_s$

$A_2 = 1.128\, d_t\, N^{0.6}\, b$

$A_4 = p_s\, t_m/576$

$A_5 = 0.00546\, N_B\, (D_h^2 - D_t^2)$

For a two-pass shell, the right-hand side of Equation 3 should be multiplied by 1.67.

In the foregoing equation, the A_1 and A_2 terms correct the flow area for the varying cross-section and may be determined graphically by means of the chart in Article 10 of this series. The term A_4 accounts for the leakage between the baffle and shell, and A_5 expresses the leakage area through the tube holes. Both of these latter terms are usually small and do not vary greatly for a given line of exchangers. Consequently, their values can usually be approximated with a fair degree of accuracy and calculation of the mass velocity term is greatly simplified.

Due to the uncertainty of some of the factors affecting the shell-side pressure loss, a safety factor of 15-25 per cent should be applied.

Calculation of the pressure drop on the shell side of tubular heat exchangers can be facilitated by use of the accompanying charts, which are based on the foregoing equations. The use of the charts is illustrated by the following examples:

Example 1.—Oil flows through a tubular heat exchanger at a mass velocity of 800,000 lb./hr.-sq. ft. At the average temperature of the exchanger, the oil has a viscosity of 5.0 centipoises and an A.P.I. gravity of 45°.

The exchanger is constructed with a single shell pass and has 76 tubes (¾-in. o.d.) set on equilateral triangles with ⅞-in. spacing between tubes. There are nine crossflow baffles. Calculate the pressure drop through the shell side of the exchanger.

Solution.—The appropriate friction factor is determined by means of the accompanying friction factor chart (Fig. 1).

Entering this chart on the bottom scale at a mass velocity, G_p, of 800,000 lb./hr.-sq. ft., rise vertically to a line for ⅜-in. (0.375-in.) distance between tubes, then move horizontally to a viscosity of 5.0 centipoises.

From this point move vertically downward to the heavy curved line and moving again horizontally to the left read the friction factor, f = 0.222, on the left-hand scale.

In the next step, the pressure loss is determined by means of the accompanying pressure drop chart (Fig. 2). The baffle factor is:

$$B = 9 + 3 = 12$$

Converting 45° A.P.I., gives an oil specific gravity of 0.802.

Entering the pressure drop chart on the bottom scale at a mass velocity of 800,000 lb./hr.-sq. ft., rise vertically to a friction factor line of 0.222, then move horizontally to a point corresponding to 76 tubes. From this point move vertically downward to a baffle factor of 12, thence horizontally to the left to a specific gravity line of 0.802. Following the diagonal guide lines read ΔP = 11 lb./sq. in.

Example 2.—A 12-ft. single-pass tubular heat exchanger is constructed with a 12-in. shell, 76 tubes (¾-in. o.d.) and crossflow baffles. The tubes are set on equilateral triangles with ⅞-in. spacing between tubes. The baffles are spaced 5.5 in. apart and are two-thirds of the shell diameter in height. The baffle diameter is 0.25 in. less than the shell diameter and the tube holes through the baffles are ¾ in. in diameter.

The exchanger must handle 100,000 lb./hr. of crude oil on the shell side. At the average temperature, the oil has a specific gravity of 0.75

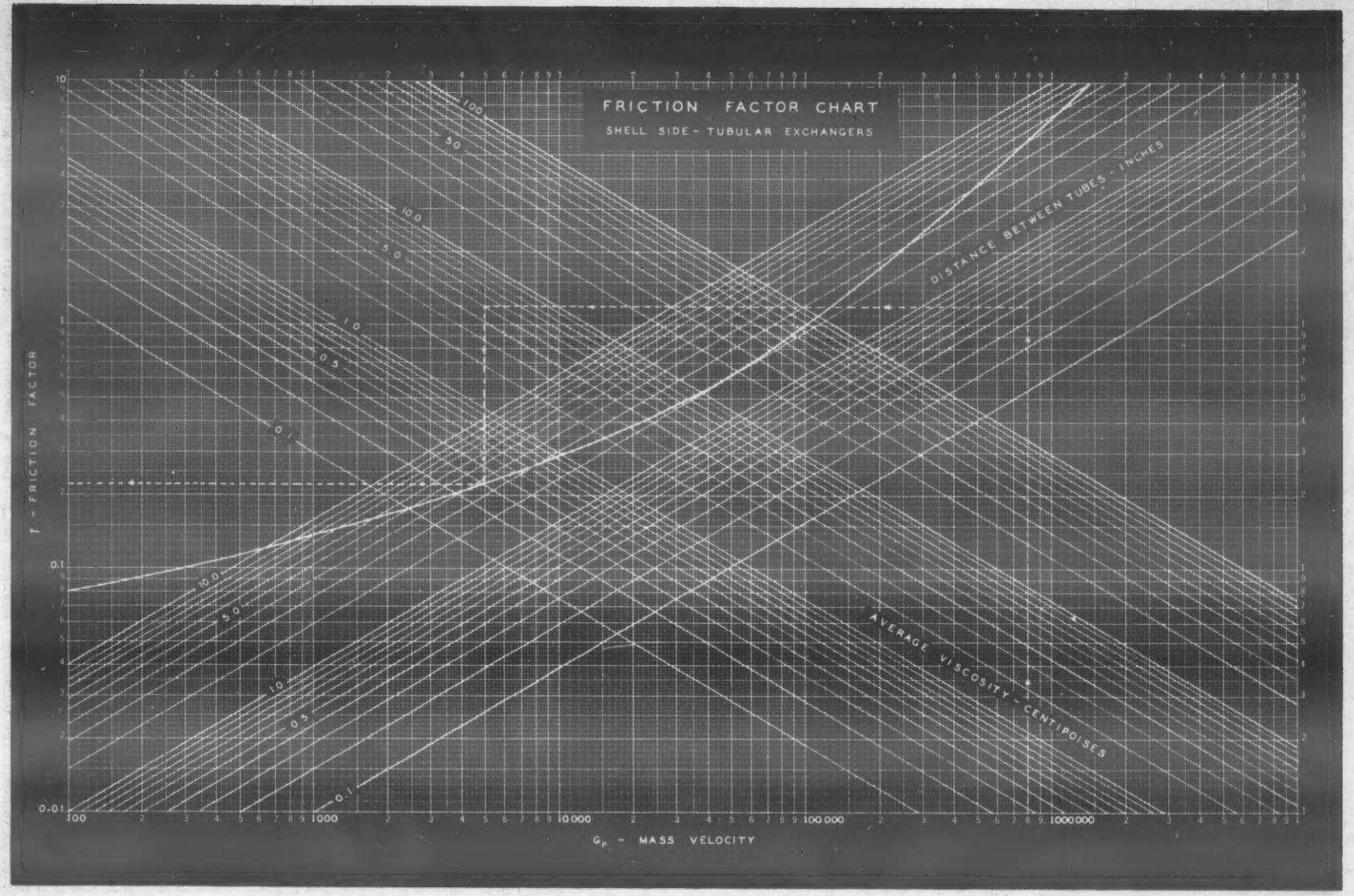
FRICTION FACTOR CHART
SHELL SIDE - TUBULAR EXCHANGERS
DISTANCE BETWEEN TUBES - INCHES
AVERAGE VISCOSITY - CENTIPOISES
f - FRICTION FACTOR
G_p - MASS VELOCITY
100
50
10.0
5.0
1.0
0.5
0.1
0.01
100
1000
10000
100000
1000000

Fig. 1

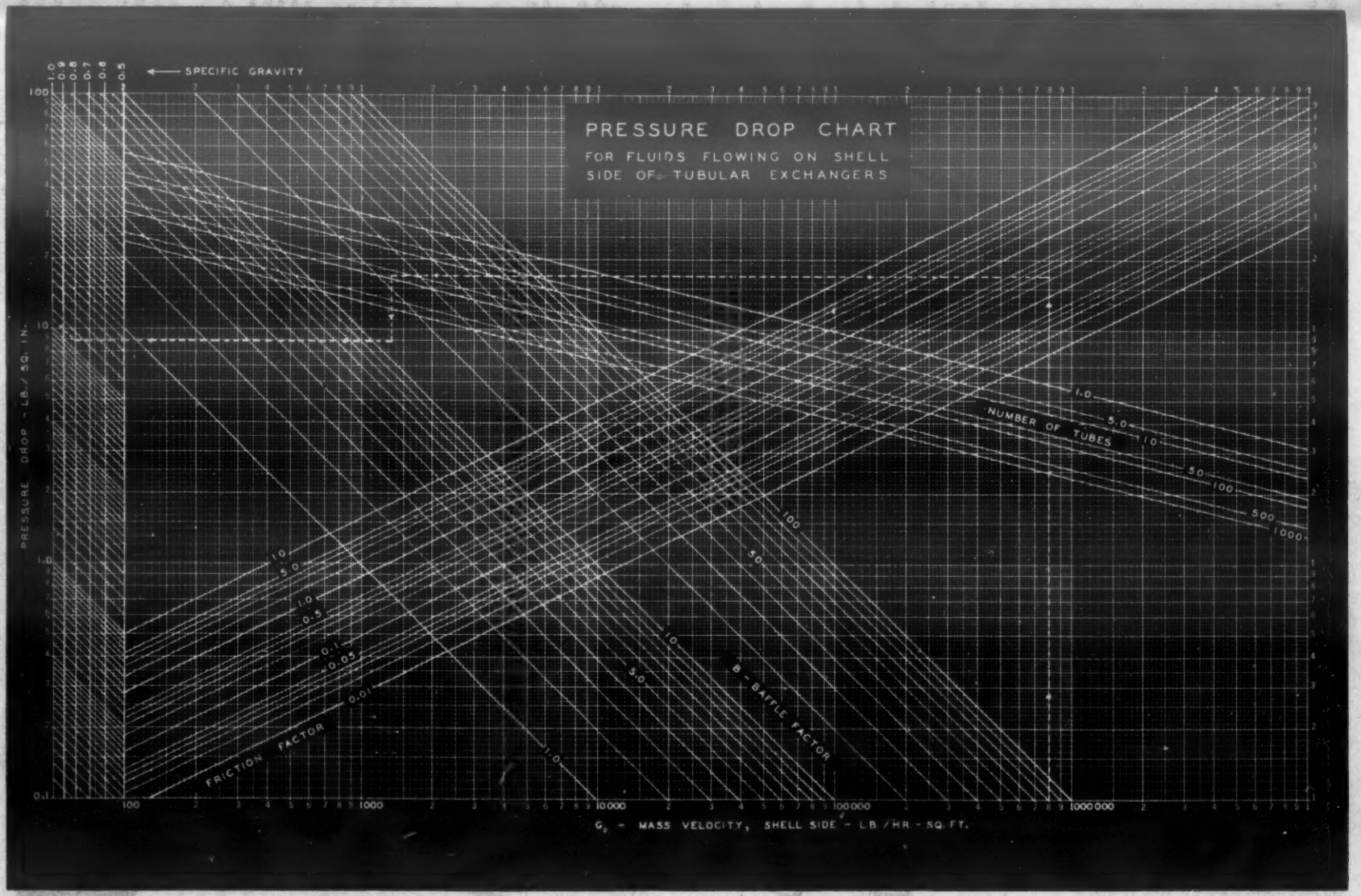
PRESSURE DROP CHART
FOR FLUIDS FLOWING ON SHELL SIDE OF TUBULAR EXCHANGERS
SPECIFIC GRAVITY
1.0
0.9
0.8
0.7
0.6
0.5
PRESSURE DROP - LB./SQ. IN.
NUMBER OF TUBES
1.0
5.0
10
50
100
500
1000
B - BAFFLE FACTOR
FRICTION FACTOR
0.01
0.05
0.1
0.5
G_s - MASS VELOCITY, SHELL SIDE - LB./HR. - SQ. FT.

Fig. 2

and a viscosity of 3.0 centipoises. Calculate the pressure drop on the shell side of the exchanger.

Solution.—The number of baffles in the exchanger is:

$$(12 \times 12/5.5) - 1 = 25 \text{ baffles}$$

Using 25 baffles, 76 tubes and a baffle spacing of 5.5 in. the value of A_3 is found to be 0.45 and A_2 = 0.28. (See Article 10 of this series.)

The baffles which are two-thirds of the shell diameter in height, cover 219° of the total circumference. A_4 is found as follows:

$p_b = \pi \times 12 \times 219/360 = 23$ in.
$t_m = 0.25$ in.

$A_4 = 0.25 \times 23/576 = 0.01$

In order to determine A_s it is necessary to lay out a sketch of the tube arrangement to determine how many tubes pass through an individual baffle, although this number will depend somewhat on design. From the sketch, approximately 56 tubes pass through the baffle.

$$A_s = 0.00546 \times 56\ [(13/16)^2 - (3/4)^2] = 0.03$$

The mass velocity for the single pass is:

$G_p = 100{,}000 \div (0.45 - 0.28 + 0.01 + 0.03) = 476{,}000$ lb./hr.-sq. ft.

Using $G_p = 476{,}000$, $d_e = 0.375$ in. and an average viscosity of 3.0 centipoises on the friction factor chart gives a friction factor of 0.23.

Referring to the pressure drop chart, and using $f = 0.23$, 76 tubes, baffle factor $= 25 + 3 = 28$, specific gravity $= 0.75$, the pressure drop on the shell side is found to be 10 lb. per sq. in.

Notation:

ΔP = pressure drop on shell side, lb./sq. in.
f = friction factor, dimensionless
s = specific gravity of fluid at average temperature
u = equivalent linear velocity = $G_p/224{,}640\ s$
N = total number of tubes in heat exchanger
N_s = number of tubes passing through an individual baffle
B = baffle factor (number of baffles plus 3.0 for single-pass shell)
d_e = clearance between tubes in row, ft.
G_p = shell-side mass velocity (for pressure drop only), lb./hr.-sq. ft.
z_a = viscosity of fluid at average temperature, lb./ft.-hr.
W = rate of fluid flow, lb./hr.
A_1 A_3 = see Article 10 of this series
A_4 = leakage area at periphery of transverse baffle, sq. ft.
A_s = leakage area in tube holes, sq. ft.
b = baffle spacing, ft.
d_s = inside diameter of shell, ft.
d_t = outside diameter of tubes, ft.
p_b = periphery of transverse baffle (not including segment cut away), in.
t_m = maximum tolerance between transverse baffle and shell, in.
D_h = diameter of tube hole in baffles, in.
D_t = outside diameter of tube, in.

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Clarence H. Griffin, who has been division foreman for Shell Oil Co., Inc., at Ventura, Calif., in the Coastal district, has been advanced to field engineer.

Brown L. Meece, formerly sales manager for Globe Oil & Refining Co. (Illinois), has been made a vice president. He has been associated with Globe since 1932.

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A.C.S. ABSTRACTS

of papers delivered before the division of petroleum chemistry, American Chemical Society, at New York City September 11-15

Fischer-Tropsch Synthesis And the Gas Industry

V. I. KOMAREWSKY and C. H. RIESZ, Institute of Gas Technology, Chicago, Ill.

The Fischer-Tropsch process is of great potential value to the entire gas industry because it offers the possibility of converting offpeak gas production to valuable products. In 1923 Fischer and Tropsch showed that mixtures of carbon monoxide and hydrogen could be converted to oxygen-containing compounds, including aliphatic alcohols, aldehydes, ketones, acids, and esters. In 1926 Fischer and Tropsch developed the Kogasin synthesis for the production of gasoline. Later developments were the "middle pressure" synthesis (1936), high melting wax synthesis (1938), "naphthene" synthesis (1941), and isosynthesis (1941). Difficulties encountered in the Fischer-Tropsch synthesis are enumerated.

A reaction mechanism is proposed which postulates that the function of the catalyst is to provide a hydrogenating-polymerizing surface. Thus, carbon monoxide is converted to methylene at the catalyst surface (hydrogenation) whereas the formation of polymethylene fragments (polymerization) leads to hydrocarbons containing more than one carbon atom. Poisoning of the catalyst by sulfur is explained on the basis of this mechanism.

The Fischer-Tropsch process can be utilized by the gas industry if investment costs for the process can be lowered, if a gaseous or readily gasified product is made for enrichment purposes, or if valuable materials can be produced. Research objectives leading to one or more of the above aims are outlined.

Catalytic Cracking of Cuts From Coastal Crude Oil

D. B. ARDERN, R. H. NEWTON and G. L. BARCUS, Catalytic Development Corp.

To obtain basic data on the chemistry of catalytic cracking, four narrow boiling cuts of coastal crude oil having A.S.T.M. mid-boiling points of 370°, 406°, 543° and 687° F. were cracked over Houdry synthetic silica-alumina catalyst at conditions of temperature (650°-900° F.) and space velocity (0-2-2.0) chosen to obtain variation in the severity of cracking. Dependent variables, pressure and catalyst activity, were controlled to give catalyst deposits equivalent to those obtained in plant operation.

The composition of the cracked products was found to vary regularly with the severity of cracking. The greater the severity the greater was the concentration of aromatics in the cracked product. Indication was obtained that the maximum concentration of cracked naphthenes will occur at moderate cracking severity. The summation of moles of ring compounds decreased as severity increased, indicating a destruction of ring compounds and no net increase in ring compounds formed from chain material. The increase in aromatics was always less than the decrease in naphthenes. Only about 40 per cent of the naphthenes destroyed appeared as aromatics. However, the production of hydrogen was much less than would correspond to simple dehydrogenation of naphthenes to aromatics.

At conditions of reasonably constant severity, the total production of olefins increased with increasing boiling range, while total isoparaffin production decreased. Both trends were most evident in the lighter boiling compounds. The ratio of iso to normal saturated hydrocarbons did not appear to vary appreciably with charging stock or cracking conditions. In the lower boiling aromatics produced, the weight ratio of benzene : toluene : xylene averaged 1:6:16 although varying somewhat with conditions.

Laboratory Evaluation of Some Factors Causing Lubricating Oil Deterioration in Engines

R. E. BURK, E. C. HUGHES, W. E. SCOVILL and J. D. BARTLESON, Standard Oil Co. of Ohio.

The deterioration of lubricating oil in internal-combustion engines is due largely to oxidation reactions. It is shown that these reactions are primarily catalytic at the engine temperatures in question, being controlled by metal catalysts such as iron, copper, etc. The effects of other possible catalytic materials, such as blow-by gas components, are considered. These observations are applied to a laboratory test procedure for evaluating the service stability of oils. A set of conditions and catalysts are developed which substantially duplicate those of the present Chevrolet engine tests. The degree of reproducibility and of correlation with engine results is shown in detail. Additional procedures are described for determining the tolerance of oils to more severe conditions.

A Universal Pressure Rectifying Column

EDGAR S. BYRON, JOHN R. BOWMAN and JAMES COULL, Mellon Institute for Industrial Research and University of Pittsburgh.

Following an introductory review of high vacuum distillation in general, a new type of rectifying column is described. This column, in contrast to all countercurrent contactor types, employs the principle of "multiple redistillation" previously described. [R. M. Schaffner, J. R. Bowman, and James Coull, Trans. Am. Inst. Chem. Engrs. 39, 77 (1943)], but differs in being applicable at all pressures. Basically, it comprises two concentric tubes. Heat is applied uniformly throughout the length of the outer one, and the reflux stream, which flows down its inner surface, is continuously vaporized. Vapor rises in the annular space between the two tubes. The inner tube is uniformly cooled throughout its length, and rotated at such a speed that the condensate formed on it from the vapor is thrown off centrifugally to join the reflux stream. The theory of the performance of such a column is developed in detail, and experimental results are presented showing fair agreement with the ideal predictions. In addition to operation at all pressures, especially high vacuum, these columns have the advantages of very low holdup, being virtually floodproof, and requiring low reflux ratio.

Investigation of the Mechanism Of Butane Isomerization Using Radioactive Hydrogen as a Tracer

T. M. POWELL and E. B. REID, California Research Corp.

In reviewing the type of catalysts that effect isomerization at low temperatures, it is noted that they include substances that have large central groups from which a hydrogen atom protrudes. Examples are aluminum chloride, phosphoric acid, perchloric acid, and benzene sulfonic acid.

The results of tritium exchange between hydrogen, hydrogen chloride, and butanes during isomerization are presented. These show that exchange of tritium in hydrogen chloride to butane is large compared to exchange of tritium in hydrogen to butane.

It is believed that catalysis of butane isomerization with aluminum chloride involves the process of providing a hydrogen atom, by means of a complex such as $HAlCl_4$, for entering the bonding sphere of a carbon atom thereby displacing a methyl group from its normal position.

Laboratory Fractionation at Atmospheric Pressure of Normally Liquid Hydrocarbons

H. J. HEPP and D. E. SMITH, Phillips Petroleum Co.

The factors involved in the laboratory distillation of normally liquid hydrocarbons when it is desired to separate near-boiling components are discussed, and suitable fractionating columns are described.

A generally useful column is described wherein the fractionating section is packed with single-turn wire helices, the column being insulated with an especially designed electrical heater which makes it possible to maintain the fractionating section in an adiabatic condition. This column is equipped with an especially designed head provided with electrical means for automatically maintaining the desired reflux ratio. Columns of this design containing up to about 100 equivalent theoretical trays have been found to operate satisfactorily.

The Molecular Weights of Asphalts and Their Constituents

GEORGE W. ECKERT and BRUCE WEETMAN, The Texas Co., Beacon, N. Y.

The molecular weight method based on the viscosity of dilute solutions was investigated for its applicability to asphalts and their constituents. The two equations proposed by Staudinger for calculating molecular weights from viscosities of solutions can be used for these materials. The constants in the equations were evaluated by using cryoscopic molecular weights of oil and resin fractions ranging in molecular weight from 370 to 900. Viscosities of benzene solutions were determined at 77° F. in a capillary viscometer. The viscosity method appears

How to prevent inflation in one easy lesson

Put that money back in your pocket!

When a lot of people want the same thing, its price goes up.

Americans have more money today—much more—than there are things to buy with it.

So every big or little thing you buy—that you can possibly do without—cuts supplies and bids prices up on what is left.

Rising prices spell inflation. And every inflation has been followed by a cruel and bitter depression . . . men out of work, homes lost, families suffering.

We don't want inflation: we don't want another depression.

4 THINGS TO DO to keep prices down and help avoid another depression

1. *Don't* buy a thing you can do without.
2. *Never* pay more than the ceiling price. Always give stamps for rationed goods.
3. *Don't* take advantage of war conditions to fight for more money for yourself or goods you sell.
4. *Save.* Buy and hold all the War Bonds you can afford—to help pay for the war and insure your future. Keep up your insurance.

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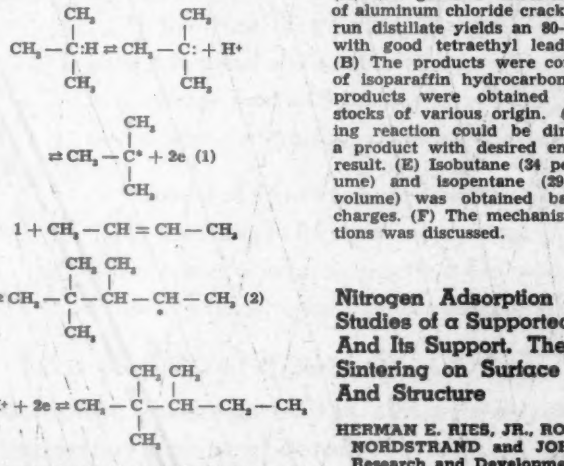
to be more satisfactory than the cryoscopic method for asphaltenes. The viscosity method gives lower molecular weights than the cryoscopic method for asphaltenes. Values of 700 to 1,800 were obtained.

The Application of the Carbonium-ion Theory to the Alkylation of Isoparaffins

F. G. CIAPETTA, The Atlantic Refining Co., Philadelphia, Pa.

The reactions of paraffin and olefin hydrocarbons in concentrated sulfuric acid indicate that the molecular hydrogenation-dehydrogenation properties of this catalyst play an important role in the alkylation of isoparaffins with olefins. The marked similarity of the carbon skeletons of the hydrocarbons produced in the alkylation of isobutane with butenes, and the copolymerization of isobutene with normal butenes in less concentrated acid, suggests the formation of a carbonium-ion intermediate during the alkylation reaction similar to that postulated by Whitmore for the polymerization reaction.

The proposed mechanism suggests the initial activation of the isoparaffin through ionization and partial dehydrogenation to form a carbonium-ion. The ion then reacts with the olefin to form a higher-molecular weight carbonium-ion, which on hydrogenation forms the saturated product. The mechanism is illustrated by the alkylation of isobutane with butene-2. (The carbon atom deficient in electrons is indicated by an asterisk.)



Rearrangement of the carbonium-ion (2) which may involve a shift of either a methyl group or a methyl group and a hydrogen atom, together with their bonding pairs of electrons, explains many of the primary products observed experimentally. Depolymerization of (2) offers a logical basis for the presence of many of the secondary products found. This mechanism also explains the necessity for employing certain reaction conditions to obtain satisfactory alkylation of isoparaffins with olefins.

Pilot-Plant Development of the Fluid Catalytic-Cracking Process

L. E. CARLSMITH and F. B. JOHNSON, Esso Laboratories, Standard Oil Co. of Louisiana, Baton Rouge, La.

The fluid catalyst-cracking process, now extensively used nation-wide, was developed by intensive pilot-plant work to signally successful commercial usage. The pilot-plant equipment used in this development comprised a variety of sizes from small laboratory units to a semiplant scale unit of nominal 100 bbl. per day feed capacity. The 100 bbl. per day plant located at Baton Rouge was relied on for the major part of the process data and engineering and equipment studies required for the commercial designs. A description of this unit and of a smaller unit of 2 bbl. per day capacity also located at Baton Rouge is given. The various engineering studies made are discussed and type of results obtained indicated.

The original 100 bbl. per day plant, which was used to pilot the first model of the commercial units, was later modified to a simpler design which has been incorporated in the later model full-scale plants. The results obtained on both designs have been translated to the commercial scale with singular accuracy.

Production of Isoparaffin Hydrocarbons by Cracking of Petroleum Fractions in Presence Of Aluminum Chloride

V. I. KOMAREWSKY and LEE WARSON, Department of Chemical Engineering, Illinois Institute of Technology.

The cracking of gas oils, naphthas, and selected fractions of straightrun products was studied under various conditions of temperature, pressure, and reaction time in the presence of aluminum chloride and hydrogen chloride. The main results obtained in the course of this work were: (A) The gasoline obtained as the result of aluminum chloride cracking of straight-run distillate yields an 80-octane product with good tetraethyl lead susceptibility. (B) The products were composed mainly of isoparaffin hydrocarbons. (C) Similar products were obtained from charging stocks of various origin. (D) The cracking reaction could be directed, so that a product with desired end point would result. (E) Isobutane (34 per cent by volume) and isopentane (29 per cent by volume) was obtained based upon the charges. (F) The mechanism of the reactions was discussed.

Nitrogen Adsorption Isotherm Studies of a Supported Catalyst And Its Support. The Effect of Sintering on Surface Area And Structure

HERMAN E. RIES, JR., ROBERT A. VANNORDSTRAND and JOHN W. TETER, Research and Development Department, Sinclair Refining Co., East Chicago, Ind.

Low-temperature nitrogen adsorption isotherms have been determined for the following materials after heat treatments at the indicated temperatures: a supported catalyst, 300°, 400°, 500°, 600° and 650°; the diatomaceous support, 340° and 650°; and the unsupported catalyst, 340°. Area values (340°) are respectively 119.8, 20.7, and 53.5 sq. m. per gram. The supported catalyst loses 5 per cent of its area at 500°, 26 per cent at 600°, and 75 per cent at 650°.

The area of the support is in fair agreement with that of a model based on electron microscope pictures.

An adsorption-desorption isotherm determination (4 days) on the supported catalyst demonstrates hysteresis. The possible importance of pore orifice dimensions calculated from the desorption curve is indicated.

Va/Vm isotherms are discussed in relation to specificity of adsorption and pore size.

Production of Heptenes and Heptanes From Propylene And Butylenes

V. N. IPATIEFF and R. E. SCHAAD, Universal Oil Products Co., Chicago, Ill.

Mixed polymerization of approximately equimolecular mixtures of propylene and isobutylene, in contact with solid phosphoric acid catalyst at 135° C. and 45 atm. pressure yielded polymers containing 45 to 60 per cent by volume of mixed heptenes and octenes, the latter consisting mainly of diisobutylene. The heptenes were hydrogenated catalytically to heptanes of 89.4 to 90.4 octane number, the latter value being increased to 98.5 by the addition of 1.0 cc. of tetraethyl lead per gallon. The heptane fractions contained a high percentage of 2,3-dimethylpentane as shown by physical constants and Raman spectra determinations. The heptane fraction also contained small amounts of 2,2 and 2,4-dimethylpentanes.

In the presence of 50 per cent butane, equimolecular mixtures of propylene and isobutylene were polymerized at 135° C. and 45 atm. pressure in the presence of solid phosphoric acid catalyst to give approximately the same yields and types of polymers as were produced from the olefin mixture not diluted by butane.

Polymers formed at 191° C. in the presence of solid phosphoric acid from mixtures of propylene and normal butylenes, present in the approximate molar proportions of 3:1, yielded hydrogenated 150° C. end-point fractions of 56 to 62 octane numbers. These octane numbers were about the same as those obtained by hydrogenating propylene polymers of the same general boiling range produced at a polymerization catalyst temperature of 205° C.

A Method of Determining Carbon in Catalyst Deposits

JAMES HOEKSTRA, Universal Oil Products Co.

In many catalytic reactions of hydrocarbons at elevated temperatures, the catalyst accumulates a carbonaceous deposit which is removed by oxidation in a stream of air. Determining carbon in the deposit on a catalyst which is to be regenerated in situ involves sampling a gas stream of varying rate and composition. In the method described the sampling is accomplished automatically by means of a series of capillary tubes, and carbon in the sample is determined by oxidation of carbon monoxide to carbon dioxide which is absorbed in Ascarite. The accuracy of the method is shown by a comparison of the results with those obtained by Orsat analysis of samples collected manually.

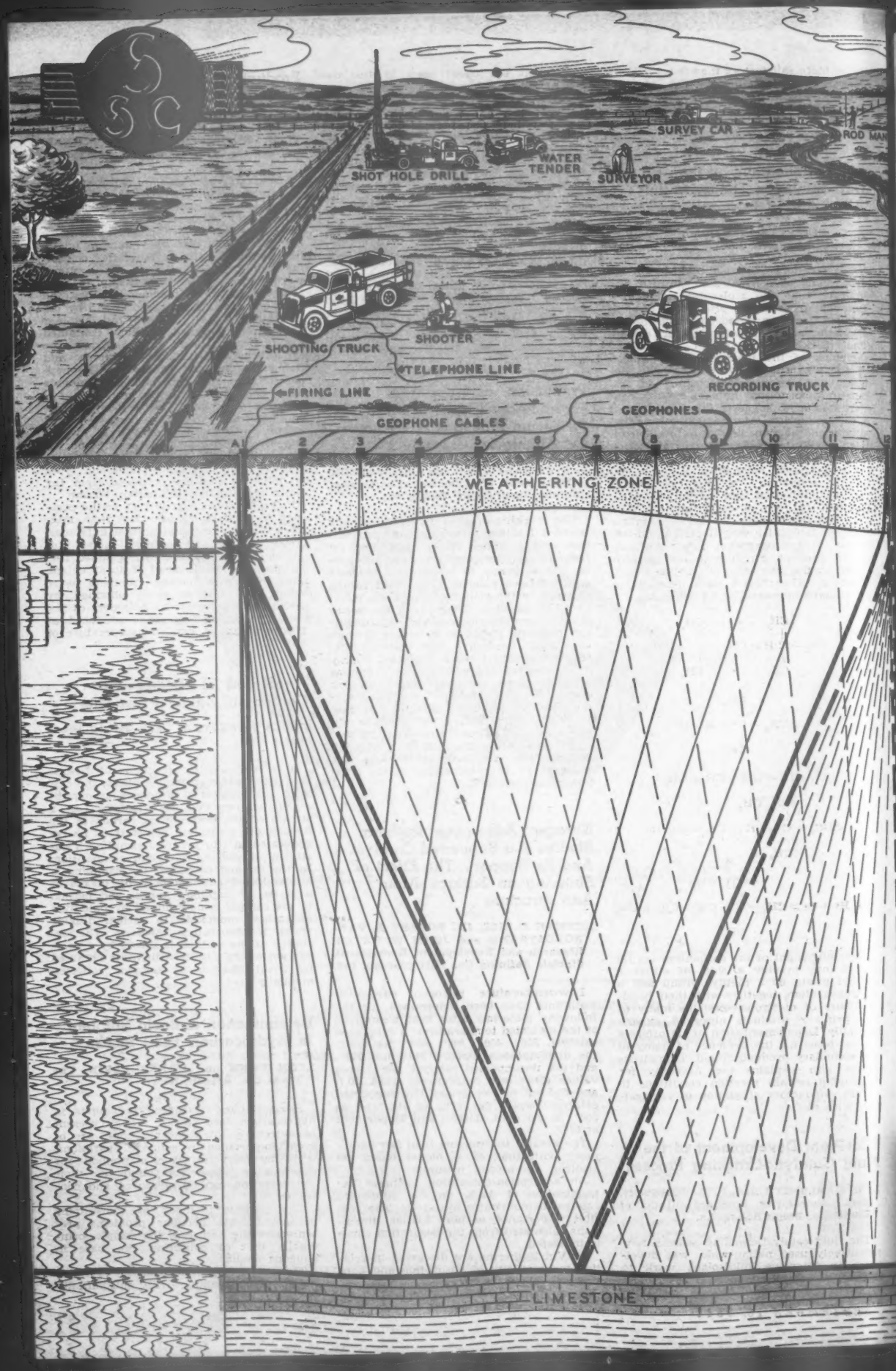
Determination of Basic Nitrogen In Hydrocarbon Feed Stocks

LEON DONN and HARRY LEVIN, The Texas Co., Beacon, N. Y.

Because basic nitrogen compounds in hydrocarbon feed stocks, though present in extremely low concentrations, are of great importance in refinery operations, it is necessary to have a method for determining these compounds so their concentration can be measured and controlled.

The obvious methods are unsuitable because of the peculiar problems presented by the nature of the sample, principally that of collecting the base in aqueous media.

The proposed method consists of treating liquefied sample with substantially


SURVEY CAR
ROD MAN
SHOT HOLE DRILL
WATER TENDER
SURVEYOR
SHOOTING TRUCK
SHOOTER
TELEPHONE LINE
RECORDING TRUCK
FIRING LINE
GEOPHONE CABLES
GEOPHONES
1
2
3
4
5
6
7
8
9
10
11
12
WEATHERING ZONE
LIMESTONE

SSC's Technique of CONTINUOUS PROFILING

Continuous profiling, developed and pioneered by Seismograph Service Corporation, has proved to be the most reliable of all seismic reflection techniques. An ingenious arrangement of the geophone and shot point lay-out permits mechanical correlation and minimizes the personal equation.

That this is possible is evident from the diagram on the left.

The energy initiated at shot point A and reflected by the limestone bed is received by the spread of geophones numbered 1 to 12. Geophone number 1, whose vibrations are recorded as trace number 1 on the seismogram at the left of the cross section, is also the same geophone used to energize trace number 1 for the spread previously shot to the left from A. Therefore, these traces are identical on both seismograms.

Furthermore, the time path (heavy solid line on cross section) from shot point A to geophone number 12 is equal to the time path from shot point B to geophone number 1 (heavy dashed line). Thus trace number 12 on the seismogram shot from A is identical to trace number 12 from B.

Because of these duplicated time paths (heavy lines) no visual correlation is necessary to follow a reflection across, or between, shot points. Sufficient traces or recording stations are used so that the reflections can be followed with certainty from one trace to the next across the spread.

The Advantages of CONTINUOUS PROFILING

1. **Complete coverage of the subsurface reflecting horizon. No gaps to miss important structural details.**
2. **Greater certainty of correlation and control of continuity of the reflector with the possibility of fault determination.**
3. **With each trace giving a depth point, complex structure can be mapped in great detail.**

nonaqueous standard acid, which neutralizes and fixes the basic nitrogen compounds, evaporating the hydrocarbon gases and titrating the excess acid.

Determination of Aromatics in Light Petroleum Distillates by The Use of Specific Dispersions Between the Sodium D Line And the Mercury g Line

H. M. THORNE, WALTER MURPHY and JOHN S. BALL, U. S. Bureau of Mines, Petroleum Experiment Station, Laramie, Wyo.

The aromatic content of a hydrocarbon mixture in the gasoline boiling range containing no olefins or diolefins may be determined from the refractive indexes for the mercury g and the sodium D lines, and from the density, all determined at 20° C. The specific dispersion of the mixture is calculated by the equation:

$$S_s = \frac{n_g^{20} - n_D^{20}}{d_4^{20}} \times 10^4$$

The per cent aromatics in the mixture may then be obtained from the equation:

$$W = \frac{S_s - 122.4}{S_a - 122.4} \times 100 + C$$

Where W is the weight per cent of aromatics in the sample, S_s is the specific dispersion of the sample, S_a is the specific dispersion of the aromatic being determined, 122.4 is the average specific dispersion of paraffins and naphthenes, and C is the correction to compensate for the deviation of the per cent aromatics-specific dispersion from a straight-line relationship. The values of specific dispersion for the several aromatics are: Benzene, 248.4; toluene, 241.4; ethylbenzene, 238.1; o-xylene, 234.8; m-xylene, 237.1; p-xylene, 238.2, and isopropylbenzene, 215.8.

Preparation and Physical Properties of Chlorinated Kerosene

RAYMOND M. DEAN and EUGENE LIEBER, Standard Oil Co. of New Jersey, Bayonne, N. J.

The chlorination of petroleum hydrocarbons and their utilization in the chemical arts are becoming increasingly important and have received considerable impetus in recent times. While both the physical and chemical properties of the chlorinated products of the lower molecular weight fractions have been extensively studied and recorded in the literature, not much can be found for the heavier fractions of petroleum. While lack of knowledge of the exact chemistry of chlorination of the higher petroleum fractions has not exactly impeded their present industrial applications, it is generally agreed that such data would very materially broaden their scope. On the other hand, lack of physical data does markedly impede progress in this field, since such data are needed for plant design and control of operation for the chlorination procedure. There has been no systematic study reported correlating the physical properties of chlorinated kerosene with degree of chlorination. It is the object of the present paper to present such a study for a kerosene fraction boiling between 348° and 525° F. and having a low aromatic content ("high "furfural miscibility temperature") and chlorinated from 5 to 60 per cent chlorine content in steps of approximately 5 per cent. The measurements comprise: elementary analysis, refractive index, surface, furfural point, kinematic viscosity, solid points, specific gravity, flash and fire, and molecular weights. These data are correlated with the degree of chlorination and the average molecular compositions obtained. A number of derived values are presented comprising molecular refraction, molecular volume, and Parachor. These are correlated against atomic chlorine contents of the chlorinated products.

The Continuous Introduction of Small Amounts of Gases to Bench-Scale Units

HERMAN S. BLOCH, ALFRED E. HOFFMAN, THADDEUS J. OLESZKO and JOSEPH A. CHENICEK, Universal Oil Products Co.

Several methods are described for continuously introducing gases to bench-scale catalytic pressure units in amounts too small to be metered by conventional means. Of these methods, the most flexible is a system of capillary feeds whereby any number of gases may be supplied in such small quantities at independently controlled and variable rates.

Determination of Tetraethyl Lead In Gasoline. Versatile Direct Evaporation Methods

LOUIS LYKKEN, R. S. TRESEDER, F. D. TUEMMLER and VICTOR ZAHN, Shell Development Co., Emeryville, Calif.

Two methods of analysis involving direct evaporation of sample with decomposition agent are described that allow accurate quantitative analysis of lead in all types of gasoline, special motor fuel blends, and tetraethyl lead fluid, regardless of the chemical constituents present. These methods, which require no elaborate apparatus, are the result of a systematic review and investigation of existing methods for the decomposition of tetraethyl lead in gasoline and for the determination of lead in soluble inorganic residues. The proposed methods convert the tetraethyl lead to inorganic lead by mixing with cold hydrochloric acid or iodine, evaporating the resulting mixture to dryness, and removing the organic matter by oxidation with nitric, perchloric, or sulfuric acids, depending on the nature of the decomposition used. The lead in the inorganic residue is determined by precipitating with a measured amount of dichromate solution and determining the excess dichromate by iodometric titration. For commercial gasolines, the reproducibility (different operators) of the methods is within 0.02 ml. of tetraethyl lead per gallon; for commercial tetraethyl lead fluids, it is 0.4 per cent lead or better.

The Determination of Metals In Lubricating Oils

K. R. FITZSIMMONS, LOUIS LYKKEN and GARRARD WYLD, Shell Development Co., Emeryville, Calif.

Detailed procedures are given for the determination of lead, copper, cadmium, barium, tin, silica, zinc, iron, aluminum, calcium, magnesium, and alkali metals in new or used lubricating oils without interference from other elements such as sulfur, phosphorus, and chlorine. In the general procedure for all elements except lead, the oil is ashed by ignition in air, the ash is treated with acid, and copper, cadmium, tin, silica, and barium are obtained in the residue after adding hydrogen sulfide and sulfate ion. Iron, aluminum, and zinc are separated from the remaining ions as hydroxyquinolates. For the principal metals, the general method is accurate to ±5 per cent of the amount present. In the simplified, direct method, the oil is oxidized with nitric and sulfuric acids, and the lead is determined as lead sulfate after removing interfering elements; iron and copper are determined colorimetrically either on the ash or on the residue obtained after oxidation with nitric and sulfuric acids. The direct method is accurate to ±0.01 per cent lead and ±0.001 per cent iron and copper, regardless of the other elements present. Data are given on the application of the method to synthetic oil samples and inorganic solutions.

The Fluidized Fixed Bed. A Method for Contacting Solids With Gases and Vapors

CHARLES L. THOMAS and JAMES HOEKSTRA, Universal Oil Products Co.

The passage of gases or vapors upward (counter to gravity) at controlled rates through a mass of powdered solid produces the "fluidized fixed bed." The passage of the gas or vapor causes the powdered solid to become mobile so that it moves about, resembling an agitated liquid. The particle size of the powder is regulated so that little of it is carried out of the reaction zone with the gas or vapor.

The fluidized fixed bed is particularly adapted to catalytic reactions in which a reaction occurs that is accompanied by large heats of reaction. The movement of the powdered solid tends to prevent the formation of localized high temperature zone "hot spots."

Examples are given showing the application of the fluidized fixed bed to the catalytic cracking of gas oil and a hydrogen transfer treatment of an unsaturated gasoline.

Determination of Aromatics, Naphthenes, and Paraffins by Refractometric Methods

R. M. GOODING, N. G. ADAMS, H. T. RALL and H. M. SMITH, U. S. Bureau of Mines, Bartlesville, Okla.

Methods are described for analyzing hydrocarbon mixtures up to 320° F. for their content of paraffins, naphthenes, and aromatics. In the range to 243° F. most of the individual hydrocarbons can also be estimated. The first step in the analysis is the fractionation of the samples into narrow-boiling-range fractions usually of 1° C. or less. Densities and refractive indices for the sodium D and mercury g lines are determined at 20°C. for each fraction. Using modified Kurtz and Headington refractivity intercept-density charts for boiling intervals of about 10° C. the naphthenes and paraffins can be determined. The aromatics at present are preferably determined by specific dispersion methods, but with some loss in accuracy the same refractivity intercept-density charts may be used. The development of these charts from both experimental and literature data is discussed and illustrated.

Carbon Formation in Catalytic Cracking

ALEXIS VOORHIES, JR., Esso Laboratories, Standard Oil Co. of Louisiana, Baton Rouge, La.

In catalytic cracking, both fixed-bed and fluid, it has been found that there is an

intrinsic uniformity in the way that the carbon deposit on the catalyst increases with the length of time since the catalyst was last regenerated. For all the data examined, the amount of carbon deposited on the catalyst at given conditions is, within limits, independent of the hydrocarbon feed rate. From this study, correlations have been derived that define mathematically the interdependence between feed-stock conversion, feed rate, and length of period between catalyst regenerations.

A speculative hypothesis is advanced as a possible explanation of the mechanism of carbon formation.

The Discovery and Determination Of Neopentane in Refinery Butanes by Infrared Spectroscopy

L. C. JONES, JR., R. A. FRIEDEL and G. P. HINDS, JR., Houston Refinery Research Laboratory, Shell Oil Co., Houston, Tex.

Qualitative study of a refinery butane stream by infrared spectroscopy has established the presence of a small amount of neopentane, although this hydrocarbon has seldom been reported. Quantitative determinations show that neopentane occurs in many straightrun butane streams and also in the proper fractions of both East and West Texas crudes.

The reference spectra upon which the qualitative analyses were based and a quantitative method for the analysis of the system propane, n-butane, isobutane, neopentane, and isopentane are presented.

Catalysts in Synthetic Liquid Fuel Processes

H. H. STORCH, U. S. Bureau of Mines, Pittsburgh, Pa.

A review is presented of the development of catalysts for the hydrogenation of carbon monoxide to yield alcohols and hydrocarbons. The development of the Fischer-Tropsch process for the synthesis of hydrocarbons from hydrogen and carbon monoxide has yielded sufficient data so that the essential outlines of the reaction mechanism can be distinguished. This reaction is apparently of first order with respect to $2H_2 + 1CO$ but is greatly complicated by at least two types of retardation by the reaction products. Data are reviewed on effect of partial pressure of the reactants and the products, of temperature, of pretreatment or conditioning of the catalyst surfaces, and of the poisoning action of sulfur and resin-forming compounds.

The development of high-pressure processes for the hydrogenolysis of coal and oil has involved an intensive search for suitable catalysts. In the primary or liquid-phase stage of coal hydrogenation the maintenance by catalytic hydrogenation of a high concentration of hydrogen carriers is important. These carriers are hydroaromatic compounds such as tetrahydronaphthalene and dihydroanthracene that readily yield their hydrogen to the unsaturated compounds resulting from the normal decomposition of the coal. Disproportionation reactions that yield aromatics and more saturated naphthenic compounds also occur. The best catalysts for liquid-phase coal hydrogenation are reactive compounds of tin, molybdenum, or tungsten. About 0.1 to 0.5 per cent of such a catalyst is added in finely divided form to the coal-oil slurry pumped into the high-pressure converters. It is also desirable to add 0.5 to 0.8 per cent of a volatile chlorine compound which acts as a "splitting" catalyst, accelerating the reduction in molecular weight of the primary products. The rates of primary coal liquefaction and of oxygen elimination are influenced only to a minor extent by the presence of catalysts. Hydrogen at high pressures and catalysts are essential for the maintenance of a high concentration of hydrogen carriers. The desirability of high-pressure hydrogen is of kinetic and not of thermodynamic nature.

The art of hydrogenolysis of "gas oil" from coal hydrogenation middle oils or from petroleum is in a highly developed state. Catalysts have been found that convert gas oil to a high octane, high rich mixture performance gasoline. These catalysts are used as a body of pellets through which are passed the oil vapors plus a large excess of hydrogen at 200 to 300 atm. pressure plus hydrogen sulfide at about 0.5 atm. pressure. The desirability of high-pressure hydrogen is largely of kinetic nature. Very little, if any, of the hydrogen used appears in the liquid product; most of it is consumed in the production of normal gaseous hydrocarbons. The function of the hydrogen sulfide appears to be to prevent reduction of the tungsten or molybdenum disulfides used as catalysts. It is probable, however, that this explanation is incomplete. Little is known about the kinetics of oil hydrogenolysis. The reactions are essentially oriented dealkylations and splitting reactions, cyclizations, and isomerizations. A possible function of the large excess of hydrogen used is to prevent polymerization reactions whose products would foul the catalyst surfaces. The high iso to normal butane ratio in the gaseous products of catalytic cracking and of hydrogenolysis of gas oils must be explained by any proposed mechanism of the splitting reaction.

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Pinion shaft floats on double row Timken roller bearings while crank shaft also turns in Timken roller bearings. Crank bearings are adjustable by means of shims. Cap does not support the weight of bearings, crankshaft and gear, as these are supported in separate housing, made larger for easy insertion of moving parts. Consequently pump is easily dismanteled. Liquid piston rod is removed from back of crosshead by removing piston rod cover and stuffing box in power frame.

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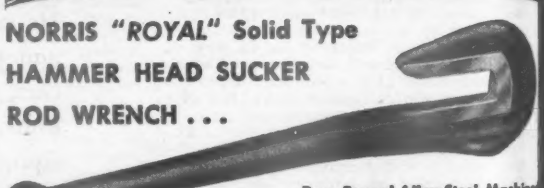

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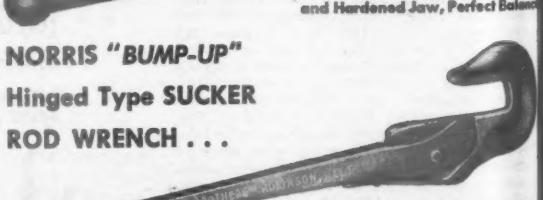

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Reactions of Hydrocarbons in The Presence of Cracking Catalysts. 5. The Polymerization Of Gaseous Olefins

CHARLES L. THOMAS, Universal Oil Products Co.

Synthetic cracking catalysts polymerize propylene and the butylenes. The butylenes polymerize at 165° C. and 45 kg./sq. cm. pressure. Propylene polymerizes at 250° to 300° C. and 50 kg./sq. cm. Under the conditions studied:

1. Silica aerogel, alumina, or zirconia are not polymerization catalysts.
2. Silica-alumina, silica-zirconia, silica-alumina-zirconia, and silica-alumina-thoria composites are catalysts.

During use the catalysts become coated with a carbonaceous deposit that lowers the catalyst activity. Removal of this deposit by combustion with air regenerates the catalyst.

The polymers are liquids, most of which boil within the gasoline range. The hydrogenated butylene polymer has an octane number of 95.

The Commercial Isomerization Of Light Paraffins

S. L. EVERING, N. FRAGEN and G. S. WEEMS, Standard Oil Co. (Indiana) Whiting, Ind.

Five commercial plants are described in which normal butane, normal pentane, and normal and less highly branched hexanes are converted to iso-compounds for aviation-gasoline manufacture. Feed stock mixed with anhydrous HCl is passed upward in small liquid drops through a liquid aluminum chloride-hydrocarbon complex catalyst. Fairly pure neohexane can be made by fractionation and recycling the remaining hexanes. Hexanes and pentanes may be isomerized together. Very high liquid yields are obtained.

Specific Surface and Particle Size Distribution of Various Silica-Alumina Gels

P. B. ELKIN, C. G. SHULL and L. C. ROESS, The Texas Co.

Three series of silica-alumina gels of various concentrations made by (A) precipitation in sequence, (B) mixing wet gels, and (C) impregnation of partially dried silica gel were examined by nitrogen adsorption, small angle X-ray scattering, and X-ray diffraction. Specific surfaces were smaller for (A) and larger for (B) than those expected for mixtures of the dried silica and alumina gels. Maxima in curves for specific surface versus alumina content for (B) and (C) at about 5 wt. per cent correlated with minima in average particle size. No alumina was detected by X-ray diffraction for gels containing as much as 26 wt. per cent alumina.

Catalytic Isomerization Of 1-Hexene

RUSSELL G. HAY and C. W. MONTGOMERY, Gulf Research & Development Co., and JAMES COULL, Chemical Engineering Department, University of Pittsburgh.

The skeletal isomerization of 1-hexene was investigated in the temperature range 350° to 500° C. and the effects of various catalysts and changing space velocity at comparable temperatures were studied. The products were chiefly methylpentenes with lesser amounts of dimethylbutenes. Lower boiling and higher boiling olefins were also formed in minor proportions.

The evidence obtained indicated that the 2-methylpentenes were primary isomerization products while the dimethylbutenes were secondary products. At 0.6 $hr.^{-1}$ space velocity the greatest amount of isomerization occurred at 300° to 350° C. Below this temperature, the reaction rate decreased with decreasing temperature, and at higher temperatures the equilibria apparently became less favorable for the branched hexenes.

Polymerization of Ethylene

V. N. IPATIEFF and V. HAENSEL, Universal Oil Products Co.

The polymerization of ethylene at elevated temperatures and pressures has been investigated using a flow method. The ensuing reactions were dependent upon the contacting material, pressure, and temperature. An empty chromium-molybdenum steel tube produces considerable carbon formation and promotes the production of paraffin hydrocarbons in the lower boiling fractions of the liquid product. The presence of metal chips having the same composition as the reaction tube enhances the carbon formation still further.

When porcelain or quartz chips were used as fillers, the reaction of true polymerization and depolymerization predominated. This was especially evident at lower pressures, that is, 30 to 50 atm. The liquid product showed the same olefinic character as the C_3-C_4 fraction.

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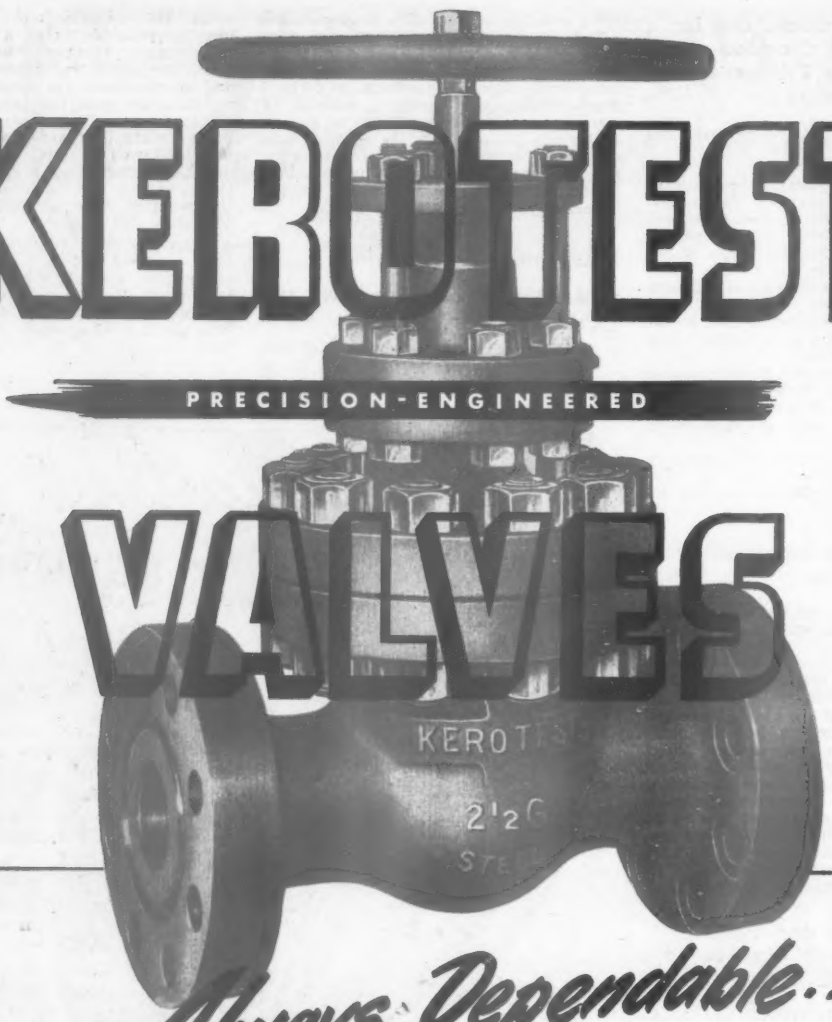

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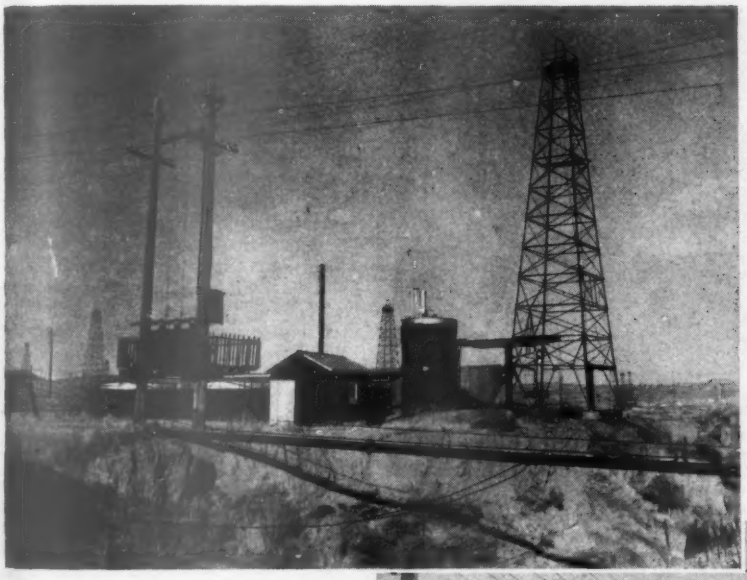
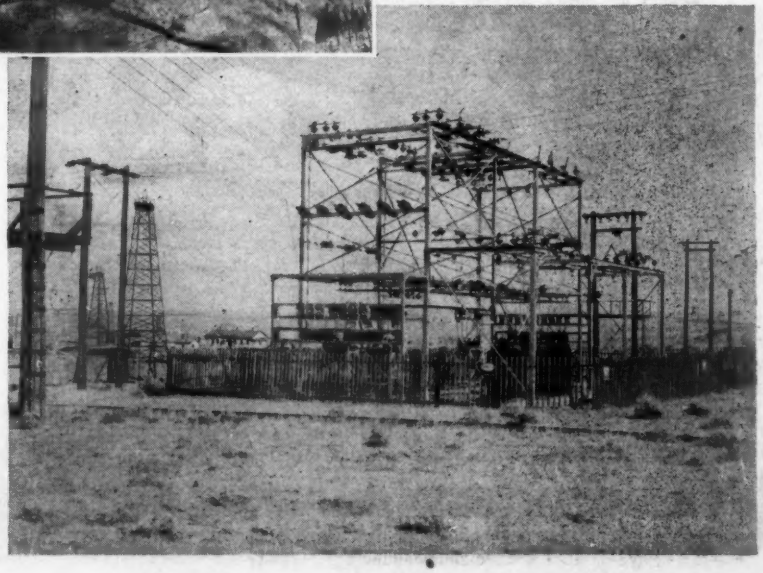
Electrification of Salt Creek Field Embraces Approximately 1,000 Wells

by Neil Williams

Use of electric power in this field has proved particularly advantageous in view of the limited gas supplies and need of remaining gas for injection and repressuring purposes. Power is supplied from a central generating plant several miles north of the field.

ONE of the most extensive single applications of electric power in oil-field operation is in the Salt Creek field, Natrona County, Wyoming. The electrification takes in the entire unitized portion of the field, embracing an area 6 miles long and 2 to 4 miles wide with approximately 1,000 wells currently still on production. Except for a relatively few flowing wells in the Tensleep, the deepest and most recently developed horizon in the field, all production is pumped. With so many wells on the pump in one large block, operated by one company (Stanolind Oil & Gas Co.), the use of electric power has been particularly adaptable and convenient, and highly efficient results have been attained.





Above: Subtransformer station and typical pumping well. Right: One of the five main transformer stations

Power From Central Plant

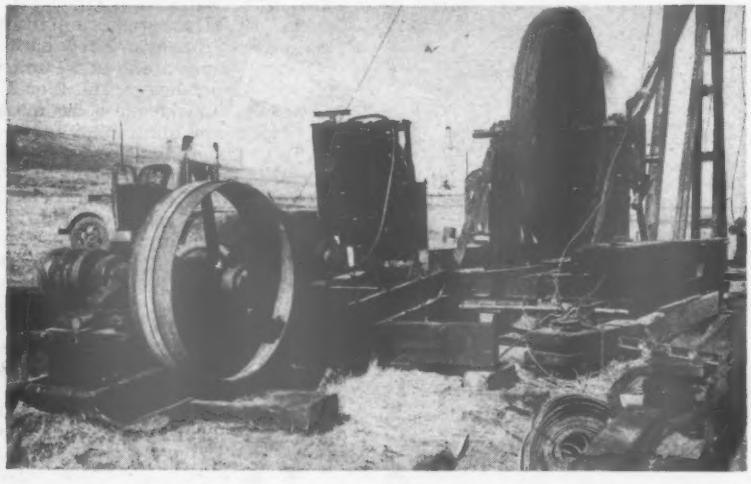
Electric power is supplied from a central generating plant located several miles north of the field, where a water supply for boilers is available. The plant contains two 12,500-kw. generators, driven by steam turbines. Three 1,300-hp. boilers generate the steam. Fuel is taken from the field gas system.

The plant delivers 33,000 volts through the main power-line system to five main transformer stations located in different sections of the field. These step the power down to 4,000 volts for lines to the various small transformer substations, which in turn reduce the voltage to 440 for field use, in a network of lines connecting all wells.

Pumping Loads Not Heavy

Most of the wells are pumped with standard rig fronts requiring individual motors. However, a few back-crank installations are in use. Pumping loads are not heavy, and 2 or 3 hp. motors are adequate in most cases. Loads are minimized by the fact that, generally, no water is present. The main producing horizon (second Wall Creek sand) definitely has only a gas drive and, although small quantities of water have appeared in a few wells in this sand, it probably is of connate origin. There is some evidence of a slight water drive in several of the sands, but even from these sands few wells make any water. Depths of the wells also are comparatively shallow, ranging from 1,200 to 2,700 ft. in the two principal horizons, the first and second Wall Creek sands.

Motor-powered pulling unit on Salt Creek well showing power line connecting cable at side on ground



Setting up electric-powered cable-tool work-over rig for recompletion job

Typical rig front pumping installation showing some of the network of power lines in field

Fluid levels are low, however, and most wells are pumped from or near bottom, some from rathole sumps at bottom.

Electrically powered pulling units and cable-tool workover rigs also are used in the field. The pulling units are truck mounted, consisting of a conventional winch driven by a variable-speed 40-hp. motor. Each unit carries sufficient electrical cable to plug into a convenient connection provided at each well for this purpose.

The cable-tool workover rigs are powered with 7½-hp. motors to supply the drilling motion. The rigs, of comparatively light weight, are skid mounted in two sections for transporting (see accompanying picture). The motor and speed-reducing drive are mounted on one unit, with the bandwheel drive on the second unit. Pulling power is supplied by a pulling unit.

Reworking Jobs

Principal reworking jobs at the present time consist in conversion and recompletion of old wells for gas-input service in connection with the injection and pressure-maintenance and repressuring program being carried out in the field.* In this program there now are approximately 200 input wells. These are selected from nonproductive wells that are located so as to give a uniform gas-injection pattern. Input wells are changed from time to time as occasion requires and according to developments in the reservoir. Wells in the field usually are not abandoned when they pump dry and go off production but are left either for recompletion in another sand or for possible later conversion to input wells.

Use of electric power has proved particularly advantageous in view of the limited gas supplies and need of the remaining gas for injection and repressuring purposes. Although gas is used for fuel under the boilers of the electric-generating plant, the volume required for this purpose is substantially less than that which would have been needed for pumping and other uses if electric power were not used. Present gas production is approximately 25,000,000 cu. ft. of which 20,000,000 cu. ft. is being returned to producing sands after gasoline-plant processing, leaving approximately 5,000,000 cu. ft. for fuel purposes at the electric-power plant, the gasoline plant, and other field uses.

Power needs for the gasoline plant and miscellaneous field use also are met by the field electric system.

*Neil Williams: "Increased Oil Recovery by Gas Injection From Old Producing Sands at Salt Creek," The Oil and Gas Journal, May 18, 1944, p. 57.

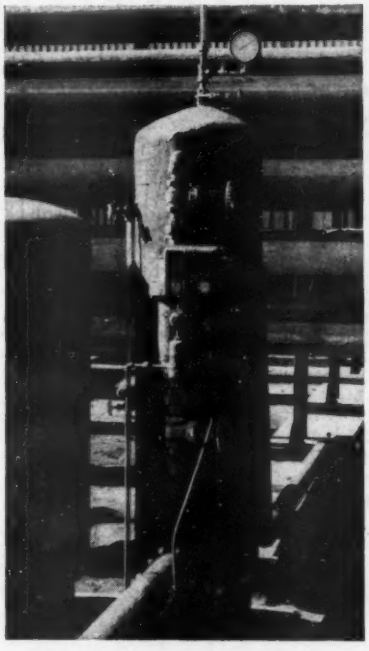
Investment of $700 Saves 4,500 M.c.f. of Fuel Per Month

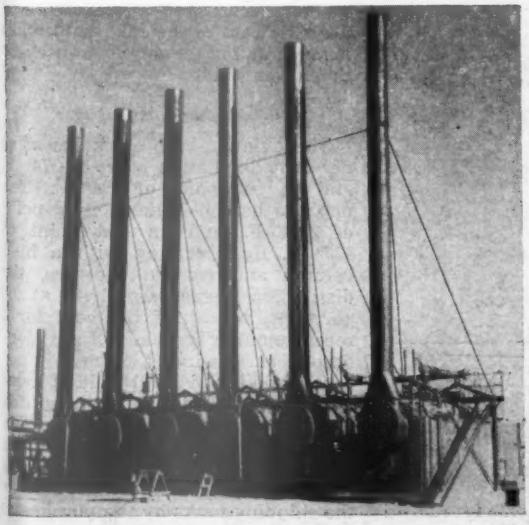
BY investing approximately $700 for material, mostly second hand, and paying for the labor required for installing the equipment, Wilmington Gasoline Co., Terminal Island, Calif., is realizing a fuel-gas saving of 4,500,000 cu. ft. per month, which at a cost, say of 10c per M.c.f. indicates a payoff in a little over 6 weeks. Not only has this fuel reduction been obtained but the six boilers operate with less depreciation of shells, flues, and combustion equipment.

The investment includes facilities for returning the steam condensate from the still preheater directly to the boiler feed-line, replacing a method whereby this condensate had been released by steam traps through atmospheric coolers in the water tower to the boiler feed-water make-up tank. Approximately 15,000 lb. per hour of steam is normally required to maintain efficient heating of the rich oil to the still. The condensate from the preheater water leg was cooled so that the make-up temperature handled by the boiler feed pumps was only 140° F. But, with the new method, the boiler feed has a temperature of 260° F., an increase of 120° F. in the water entering the boilers.

Emergency Steam Traps

A bypass was installed on the water leg beneath the preheater, leaving the original steam traps in place for emergency use. The condensate was piped to a small vertical receiver equipped with a new liquid-level controller. Two conventional reciprocating steam pumps installed on a base near the distillation equipment pump the water from the receiver directly to the boiler feed line. The liquid-level instrument on the receiver controls the speed of the condensate pumps so that the water entering the receiver is removed at the same rate as produced.





Above: Still preheater condensate receiver fitted with automatic controls for continuous pumping to boiler-feed line

Left: Battery of six boilers which supplies steam for pumps and processes, and which requires approximately 150,000 cu. ft. of fuel per day less than formerly due to method employed to return preheater condensate directly to boiler-feed line

Use of Cylinders in Directional Drilling

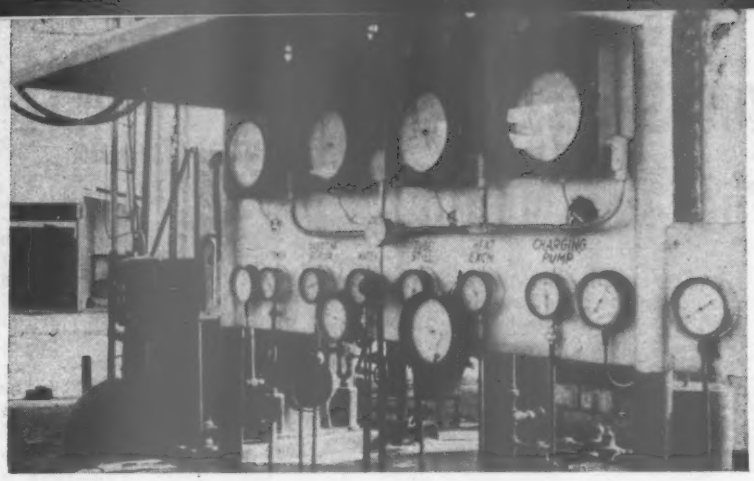
(Continued from page 78)

in a 50-ft. or 100-ft. radius, whichever is stipulated. This operator also provides that all slush and other waste materials shall be removed and all pits filled in order to comply with provisions of drilling regulations of the Long Beach Harbor commissioners. The model ordinance under which operators work in the Long Beach Harbor section of the Wilmington field is an excellent example of what can be done with proper requirements. This field is comparatively free of objectionable features, due to wise regulations imposed by civic authorities and others interested in development work

Several Undrilled Locations

There are a considerable number of undrilled locations in the Long Beach Harbor section of the Wilmington field available for future work. No accurate check on the number is available but Union Pacific Railroad has at least 200 and Long Beach Oil Development Co. probably has another 200 as a minimum. Present development of tidelands in this field is on the basis of one well to 5 acres. In developing the Terminal zone it is customary to land surface pipe at 350 ft. and if the hole is to be directionally drilled the first whipstock is landed at 800 ft. An 11¾-in. water string is then landed and cemented at about 2,500 ft. followed by a full string of 8⅝-in. cemented through perforations between zones. It is significant to note that Long Beach Oil Development Co. has drilled and completed approximately 140 wells at Wilmington and has not lost a single hole because of mechanical trouble. All of these wells have been drilled using the cylinder method and every well has been bottomed where desired. Royalty Service Corp., Union Pacific, General Petroleum Corp. and others have also made enviable records in the development of the field.

In developing the Ranger zone of Pliocene age, it is customary to land 12¾-in. surface pipe at 350 ft. and where the hole is to be directionally drilled the first whipstock is set at 500 ft. An 8⅝-in. water string is then cemented at 2,500-3,000 ft. depending upon location in the field followed by the necessary amount of 5½-in. liner. One operator recently had his first rod failure in 3 years thus disproving the old theory it would be difficult pumping a directionally drilled well. The average inclination in Wilmington tideland wells is about 35° although some wells have inclinations as much as 62°.



Panel containing automatic controllers on fractionating column where four cuts are made to specifications under a refining loss of 0.6 per cent

Refinery Revamped For Manufacture of Aviation-Base Stock

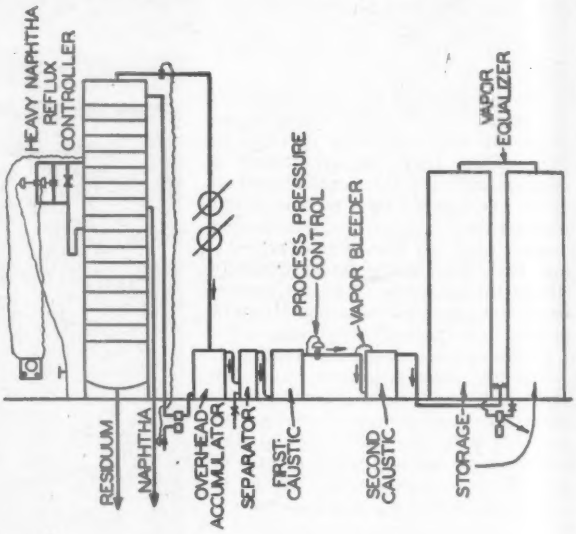
ORIGINALLY built to produce gasoline, kerosene distillate, diesel fuel, and road-surfacing material, McCallen Refining Co.'s plant at Huntington Beach, Calif., has been revamped to supply its quota of aviation-base stock. The fractionating column is 48 in. o.d. and 66 ft. high, equipped with facilities to manufacture four products simultaneously. To lower the distillation and storage losses, some of the methods used by natural-gasoline plants have been adopted.

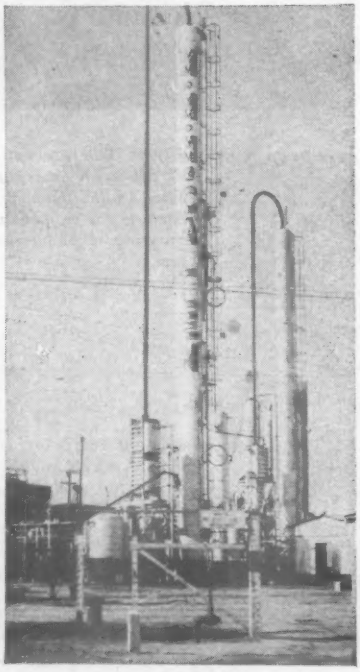
The column is operated at 22/23 p.s.i. with the condensate passing from the accumulator to a water leg for the removal of condensed process steam. Two caustic wash drums are installed in the product line for the removal of H_2S. One drum is at the column and the other near the storage tanks. The pressure-control valve is set between the caustic wash drums, and is automatic. A ¼-in. copper tube vents a portion of the vapors from the product line at the second wash tank to prevent excessive agitation and carryover of the solution. Liquid and vapors flow into the base of the vertical pressure storage tanks so that practically all of the vapors are forced into solution.

Tanks Installed Vertically

The storage tanks are installed vertically and are similar to vessels regularly installed at gasoline plants. Connecting vapor-equalizing lines allow vapors to pass out of the tank being "made" into the one which has recently been emptied by pumping to the pipe line. Safety valves set at 15 p.s.i. prevent excessive pressure from being built up in the tanks.

Reflux is pumped from the accumulator to maintain a column temperature of 294° F. at the top. Side reflux for the naphtha stream is controlled by two valves, one operated by a recording instrument on the control panel and the other by plant instrument air. This second valve is set at the will of the operators by allowing more or less air to pass through a hand-set valve





***Above:** Simplified flow diagram showing arrangement of automatic and manual control equipment. **Left:** Crude-topping and road-oil plant of McCallen Refining Co. which has been converted to an aviation base-stock distillation unit*

near the base of the column to make it needless for the employe to climb the tower ladder.

Properties of Stock

The aviation-base stock has a 90 per cent distillation point of 274° F. and an end point of 294° F. The naphtha has an initial boiling point of 315° F., and an end point of 437° F. By operating with a high column and storage pressure, the distillation losses were held at 0.6 per cent, and at 0.7 per cent for 2 recent months. The yield of aviation-base stock was increased to 14½ per cent while the over-all yield of aviation-base stock and heavy naphtha was increased to 25 per cent. The losses include all pumping, handling and distillation losses from the crude-receiving tanks to the gages at the shipping tanks by the purchaser.

PROPERTIES OF CEMENT

CEMENT is manufactured from clay and limestone materials, comprising chiefly compounds of lime, silica, alumina and iron oxide. The components, finely ground, are calcined to incipient fusion (in the general range of 1,400° to 1,600° C.). The calcined product, or clinker, is ground to a fine powder along with a small amount of gypsum.

Portland cement has, as its principal chemical constituents, calcium oxide (CaO), aluminum oxide (Al_2O_3) and silicon dioxide (SiO_2), and there are small amounts of magnesium oxide (MgO), ferric oxide (Fe_2O_3), and sulfur trioxide (SO_3). These constituents occur in the following combined forms:

Dicalcium silicate ($2\ CaO \cdot SiO_2$)

Tricalcium silicate ($3\ CaO \cdot SiO_2$)

Tricalcium aluminate ($3\ CaO \cdot Al_2O_3$)

Tetracalcium alumino-ferrite ($4\ CaO \cdot Al_2O_3 \cdot Fe_2O_3$) together with calcium sulfate.

The chemical reaction of dry cement upon the addition of water is a complex process. With water, the tricalcium aluminate hydrates immediately and is first amorphous, or colloidal or gel-like, and later crystalline. Calcium sulfo-aluminate also crystallizes from the gypsum. The tricalcium silicate begins to react in about 24 hours, the lime crystallizing, and the less basic part forming a gel. Other complex reactions proceed, with the processes of hydration and hydrolysis being progressive and in part relatively slow.

The quality of a cement job, as found in cementing casing where a neat slurry is employed, is mainly determined by four factors: (1) Chemical composition; (2) fineness; (3) amount of water used in the slurry mix, and (4) procedure of mixing and transporting to the final setting position.

The chemical composition of commercial cements varies to some degree, dependent upon the raw materials used in manufacturing and also upon the manufacturer's design of the cement to fit certain specialized oil-well applications. The fineness of the grind (percentage through 200 mesh) and the resultant specific surface obtained (square centimeters per gram) are very important in determining the physical properties of set cement because the reaction between dry cement and water starts and proceeds at the surfaces of the cement particles.

In cementing casing in shallow wells the danger of premature setting is largely absent due to the short time needed to place the cement. Further, the time necessary to wait for an adequate "set" may be lessened by using a setting accelerator. Calcium chloride in amounts up to about 2 per cent by weight commonly is used for this purpose.

In cementing deep wells, however, unusual conditions and difficult operational situations present themselves, since subsurface temperatures up to 200° F. and pressures up to 5,000 p.s.i., or higher, may be encountered. Cement slurries thicken and set more rapidly with increasing pressures and temperatures. Moreover, in deeper wells, a longer time is required to place the cement into its final setting position. Because of these factors the oil and cementing companies have conducted special investigations of the pertinent factors involved in cementing long strings of casing and other unusual cementing operations. The research has included thickening-time tests and experiments on cement consistencies or pumpability. The tests were designed to serve as valuations for specific subsurface conditions.

While special cements have been offered the industry under the rather loose term of "oil well" cements, actually manufacturers are presenting products designed to meet one or more of the following conditions: Slow setting, high early strength, resistance to detrimental action of sulfate-bearing water; situations where a gel-like or thixotropic quality is desired.

Gel-type cements are simply admixtures of bentonite or colloidal up to about 4 per cent with cement. For successful cementing of casing, a continuous and homogeneous body of slurry is necessary and when bentonite is dispersed in the water phase of the mix the rate of sedimentation of the cement is retarded. With free water present, the cement will be held in suspension longer with a small amount of bentonite present because the gel-like slurry will have greater plasticity and viscosity.

The cementation of casing in oil and gas wells must be a carefully designed, calculated, and executed procedure. In the design of a cementing job for any given well, certain arithmetic computations must be made for the particular situation. These computations are facilitated by the use of cementing tables which are found in numerous handbooks and tubular goods manuals. An "abridged cementing table" is given below.

CEMENTING OF VARIOUS CLASSES OF CASING

Casing			Lineal feet cemented on outside of casing per sack of cement for various casing and open-hole combinations. Diameter of hole in inches						Lineal ft. inside of casing filled by one sack cement	Fluid capacity of casing per 100 lineal feet	
Sizes (o.d.)	Weight/ft. complete (lb.)	Thickness (in.)	6	8	10	12	14	16	18		Bbl. (42 gal.)	Cubic ft.
4½	16.0	0.334	15.0	4.9	2.6	...	...	...	...	12.1	1.6	9.09
5½	17.0	.280		6.5	3.0	1.8	...	...	...	7.5	2.6	14.69
6⅝	20.0	.288		10.0	3.6	2.0	1.3	...	...	5.5	3.5	19.96
7	24.0	332		13.4	4.0	2.1	1.4	...	...	5.0	3.9	21.90
7⅝	29.7	.375			4.8	2.3	1.5	...	...	4.3	4.6	25.78
8⅝	32.0	352		...	7.8	2.9	1.7	1.1	...	3.2	6.1	34.22
9	34.0	355		...	10.6	3.2	1.8	1.1	...	2.9	6.7	37.48
9⅝	36.0	352		...	...	3.9	2.0	1.2	...	2.5	7.7	43.41
10¾	40.5	350		...	...	7.1	2.5	1.4	...	2.0	9.8	55.09
13⅜	54.5	380	...	...	...	...	...	2.6	1.4	1.3	15.5	86.79
16	65.0	375	...	...	...	...	...	...	2.9	0.87	22.6	126.84

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Admits pressure above the piston to regulate packer compression when stripping tool joints.

2 PACKER SUPPORT
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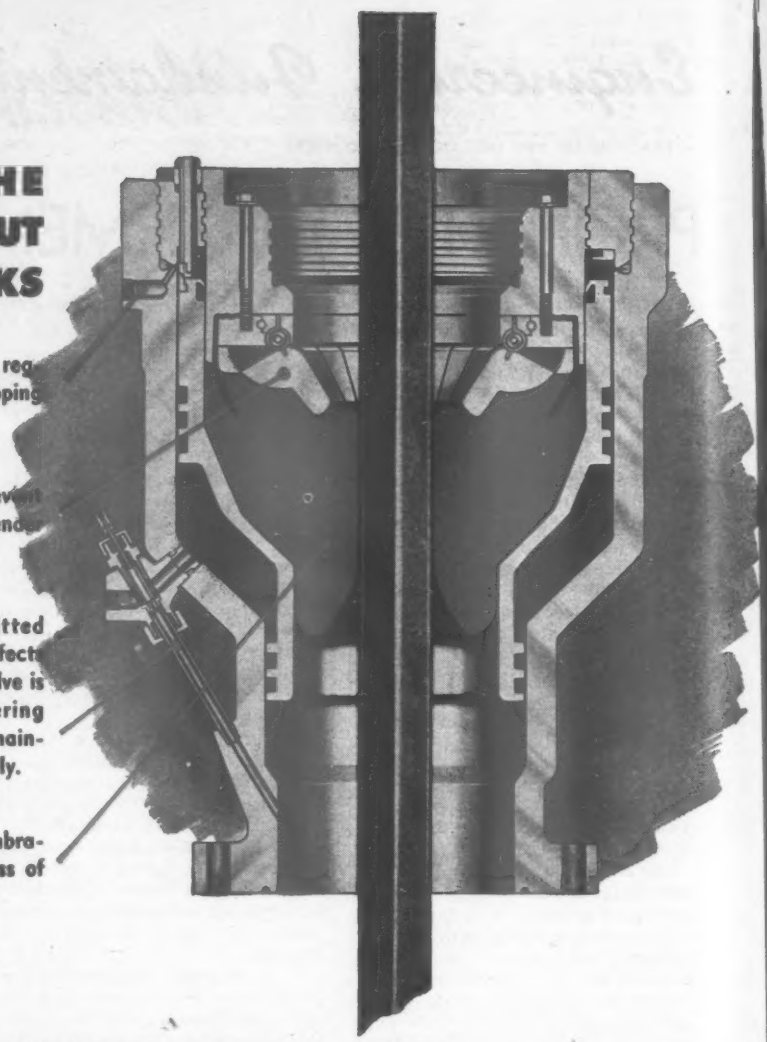

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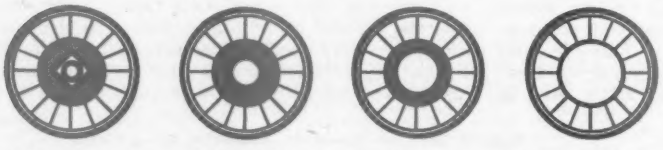

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The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Intermediate or Mixed-Base Crude Oils

THIS most abundant type of crude oil has properties so intermediate between asphaltic and paraffin base oils that there are neither noteworthy advantages nor serious disadvantages. They are more nearly like paraffin-base than naphthene-base crudes. Some points are:

1. Rich in straightrun gasoline.
2. They contain wax.
3. They constitute almost 75 per cent of all crude oils.
4. Sulfur ranges from 0.1 per cent to over 2.6 per cent.
5. Octane number of gasolines is poor.

The Bureau of Mines further classifies intermediate base oils as paraffin intermediate and intermediate paraffin base. The paraffin intermediate oils have gasolines similar to those of paraffin-base oils and the intermediate paraffin oils have lubricating oils similar to those in paraffinic oils. The latter are known as green or lubricating-oil crudes.

Most of the well-known high-sulfur crude oils are mixed base, such as those of West Texas, California, New Mexico, and Montana. These oils constitute about 15 per cent of the total production and they have an average sulfur content of 1.53 per cent whereas the remainder of the mixed-base oils contain only 0.32 per cent sulfur.

Gasoline.—The gasoline yield averages 34.8 per cent ranging from 10 per cent for certain high-sulfur oils to 50 per cent for very light crudes. A. S. T. M. octane numbers are somewhat as follows:

	Range	Ave.
Paraffin intermediate	41-50	45.3
Intermediate	50-61	56.0

Kerosene and diesel fuel.—Yields of high-quality kerosene are high and the ignition quality (cetane numbers and diesel index) of the diesel fuels is high but they have high pour points. Diesel index ranges from 49 to 65.

Lubricating oils.—These are similar to paraffinic oils except that the viscosity index is somewhat low. The index is not low enough to cause trouble in regular winter climates.

Yields and cracking.—Most mixed-base oil is processed by cracking. The total yield by such a processing often exceeds 50 per cent and may reach even 75 per cent if the entire crude oil is subjected to cracking. Yields of straightrun gasoline are somewhat as follows:

25 A.P.I.	5-21%
35 A.P.I.	21-43%
45 A.P.I.	43-75%

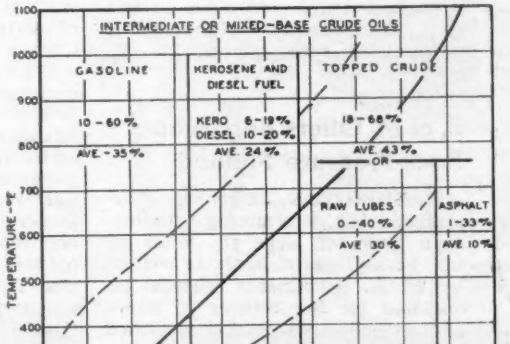

Fig. 1

REFINER'S NOTEBOOK TOPICS

The Refiner's Notebook now turns to crude oils and their characteristics by discussing mixed-base, paraffin-base, aromatic-base, and high-sulfur crude oils; as well as a comparison of oils of different base, laboratory distillations, evaluation of yields, and realizations of profits. Details of storage facilities will be completed. Preceding topics and ones that immediately follow are:

No. 5. Eliminating Vapor Space in Storage.
No. 6. Gas-Holder Systems.
No. 7. Volatile-Liquids Storage.
No. 8. Strength of Tanks and Heads.
No. 9. Mixed-Base Crude Oils.
No. 10. Tank Strapping Tables.
No. 11. Paraffin-Base Crude Oils.
No. 12. Heating Coils for Tanks.
No. 13. Naphthene Base Crude Oils.
No. 14. Tank Foundations and Auxiliaries.

Comments or suggestions as to pertinent topics are invited from our readers, but the topics must be of general interest.

The average gravity of these crudes is about 37° (from 25° to 47° A.P.I.) The large amount of mixed-base crude makes its properties dominate the gasoline market. Thus, regular-grade gasoline (1939) had an octane number of about 73 which is about the same as a mixture of mixed-base cracked and straightrun gasoline to which has been added 1 to 1½ cc. of tetraethyl lead fluid.

No. 9 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

Natural Gas

FPC Postpones Hearing of Columbia Subsidiaries

WASHINGTON. — Federal Power Commission has postponed to October 3 the hearing previously set for September 5 to determine (1) the status of United Fuel Gas Co., Warfield Natural Gas Co., Cincinnati Gas Transportation Co., and Huntington Development & Gas Co. under the Natural Gas Act, and (2) the reasonableness of rates charged by these companies in connection with the transportation or sale of natural gas. All four companies are subsidiaries of Columbia Gas & Electric Corp. and have their principal offices in Charleston, W. Va.

The investigation arises out of complaints filed by Pennsylvania Public Utility Commission and the city of Columbus, Ohio.

New Method Mixes Liquid Rubber With Carbon Black

AKRON, Ohio.—A new synthetic-rubber process, which permits carbon black to be mixed with rubber in liquid form, is announced by General Tire & Rubber Co. The new method, now in commercial use at the company's plant in Baytown, Tex., is said to reduce milling time on the wearing surface of a tire by one-third, thus releasing manpower for other tire-industry employment and relieving a serious bottleneck. Company officials say the innovation will not only step up production of tires for war use but will make it possible for civilians to obtain tires at an earlier date than has been expected.

Tires made from this homogenized rubber are declared to be superior to synthetic tires previously made because the new system assures a perfect mix, permitting chemists to blend rubber naturally rather than mechanically.

The practice has been to make rubber and then grind black into it in giant mills. Now carbon-black slurry is added to liquid rubber and when the finished rubber comes from the plant the carbon black is perfectly distributed throughout the rubber.

The discovery opens the way for ultimate elimination of rubber milling, an expensive, time-consuming operation. Another possibility is the greater use of synthetic rubber even after natural rubber is available, for the process reduces the cost of synthetics. In addition to lowering milling time and manpower operations 35 per cent the method saves 20 per cent in power consumption, company officials say.

The Baytown plant is government owned, but operated by General Tire. Other leading companies have asked for installation of the needed equipment for the new process in other government synthetic plants.

Seeks More Time to Make Up for Overproduction

OKLAHOMA CITY.—Consolidated Gas Utilities Corp. has asked the State Corporation Commission for additional time in which producers may make up for excess output at five wells to which it has connections, requesting that the time be extended to March 1945. The commission heard testimony Sept. 13.

In its order of June 8 the commission reviewed the condition of the Charlson sand zone of the Chickasha field in Grady County, and ordered that the overproduced wells be restricted or shut in until the "overage" should be wiped out. If the wells to which Consolidated is connected are shut down at this time, the company will be unable to meet its requirements, the application said.

B. of M. Offers Report on Back-Pressure Method

WASHINGTON.—A report on the problem of determining absolute open flows of large gas wells by the back-pressure method, written by M. A. Schellhardt, natural-gas engineer for the Bureau of Mines at Bartlesville, Okla., and published by the bureau, includes a discussion of limitations imposed on the range of back-pressure data obtainable at many large gas wells by the relationship between their delivery capacities and that of equipment such as heaters, meters and separators installed to handle gas deliveries produced by routine recovery operations. The report illustrates the effect of relatively small errors in subsurface pressures on absolute open flows extrapolated from pressure-flow data representing limited, and more extended ranges of well operation, respectively.

The publication, Bureau of Mines Report of Investigations 3767, "Application of the Back-Pressure Method for Determining Absolute Open Flows of Large Gas Wells," may be obtained from Bureau of Mines Department of the Interior, Washington 25, D. C.

Empire and United Natural Seek to Extend Facilities

WASHINGTON. — Federal Power Commission held hearings this week as follows on applications of two natural-gas companies for permission to extend their facilities:

September 11, United Natural Gas Co., Oil City, Pa., to construct and operate a 37-mile 12¾-in. natural-gas pipe line from a point near the Manufacturers Light & Heat Co.'s Ellwood City compressing station in Beaver County, to the applicant's Mineral compressing station in Venango County.

September 12, Empire Gas & Fuel Co., Wellsville, N. Y., to acquire and operate about 8 miles of 8-in. pipe line in Potter County, Pennsylvania. The line, now owned by Empire Producing Corp., extends from a connection with the New York State Natural Gas Corp.'s line in Hebron Township, to a connection with the applicant's 6-in. line at Holmes Junction.

Natural-Gas Investigation Likely to Be Authorized

WASHINGTON. — Definite decisions with respect to conservation of natural gas are expected to emerge from an investigation which informed circles say will receive congressional authorization next fall. A subcommittee of the Senate interstate commerce committee, headed by Senator Tunnell, of Delaware, has reported favorably on the Overton resolution directing Federal Power Commission "to inquire into and report to Congress on various matters with respect to natural gas." The Tunnell report would increase the proposed appropriation for this inquiry from $30,000 to $100,000. It would direct FPC to submit an interim report within 6 months and final report within a year. Also, in an effort to quiet rival claims of the Interior Department, the Tunnell report would direct FPC to make full use of data collected by Interior's Bureau of Mines and otherwise to cooperate with the bureau.

Approval of the Tunnell report by the Senate interstate commerce committee as a whole is expected as soon as a working quorum of the full committee can take the matter up

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REFINING

General Petroleum Plans Expansion of Facilities

LOS ANGELES.—General Petroleum Corp. has announced plans for expansion of its refinery at Torrance to provide additional facilities for manufacture of 100-octane gasoline. Construction of the new unit, which will cost about $4,000,000, will give employment to 750 men during the ensuing year.

"If the European war ends within the next 2 or 3 months," said S. J. Dickey, president of the company, "thousands of soldiers, released from war duty will return to Los Angeles. It is feared there may be a period of unemployment while plants are changing to peacetime industry, and this work will help alleviate that situation. The new plant will provide methods for quick adaptation to the manufacture of products that may be required from the highest octane gasoline down to diesel and fuel oils."

Approval Recommended for Shell's Refinery Project

HOUSTON.—Application of Shell Oil Co., Inc., for permission to build a catalyst cracking plant, costing $10,800,000, at Deer Park, site of the company's refinery, has been recommended for approval by the modified area production urgency committee of the Houston district of War Production Board. The application was presented by R. V. Shirk, official of Petroleum Administration for War.

Action by the committee means approval at the district level, and probably favorable reaction from WPB in Washington, to which the application now goes.

The committee found there is a sufficient labor supply in the district to construct and operate the plant, it said.

P. E. Foster, manager of the Shell refinery, said the original application was filed more than a year ago, and that the latest application was sent in about a month ago.

Benzene, Toluene, Xylene Allotments Sharply Cut

WASHINGTON. — Civilian allotments of benzene, toluene and xylene have been sharply cut by War Production Board owing to rising military requirements. No relaxation is expected before next April, WPB officials said.

Benzene, a byproduct of the coke industry, is used to raise the octane rating of aviation gasoline. Smaller quantities will be available for use in lacquer thinners and analine dyes.

Ordnance requirements for toluene in the production of TNT have expanded. A byproduct of coke and of petroleum, toluene is used in lacquer thinners, medicinals, dye intermediates and petroleum additives. WPB may reduce the allotment of toluene for the manufacture of aviation gasoline, thus making greater quantities available for production of explosives.

A byproduct of both coke and petroleum, xylene is required in increased quantities for the aviation-gasoline program. Corresponding cuts have been made in allocations to the protective-coating industry. WPB is taking steps to increase the output of xylene produced from petroleum.

Movement of Residual Fuel Relieves Refinery Storage

CHICAGO. — Storage capacity of Central West refineries, overtaxed by excessive stocks of residual fuel oil, is being relieved by substantial shipments of that material to the Atlantic seaboard. This eastward movement, effected largely through arrangements made by Petroleum Administration for War's District 2 officials, is reported to have saved some refiners from actual shut-

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downs. The storage problem had become so serious for certain operators in Illinois, Indiana and Kentucky that the entire activities of plants were threatened.

Every effort is being made by PAW to keep refineries in operation in the interest of the war effort, and it was regarded as imperative to give relief to some plants by affording them outlets for their swollen inventories of heavy fuel. The Chicago office managed this by bringing overburdened suppliers in this area into touch with East Coast buyers who could handle the material.

Lack of adequate crude supplies, formerly problem No. 1, was overshadowed in some cases by the difficulties presented by mounting stocks of residual fuel.

Earlier in the war period, the East was calling insistently for heavy fuel oil at a time when the interior had little to offer. The industry in the Middle West has felt that now, with a surplus in existence, it was reasonable to ask the East to continue taking material when it was backing up here and threatening to shut down refineries needed for war products supply.

PAW here is said to have had the same view. In the cases of some plants, the volume moved through PAW aid is said to have approximated 10,000 bbl. a month.

Control of Gasoline Sales In Midwest to Tighten

CHICAGO.—Tighter control of distribution of regular-grade gasoline has been delegated to W. W. Vandeveer, director of District 2, Petroleum Administration for War. Owing to curtailed supplies of this material, he has been empowered to issue directives to effect equitable distribution in the 15 states comprising District 2. Suppliers who have house-brand motor fuel in excess of their requirements will be asked to help those who do not have enough to fill needs of their regular customers. Also directives may be employed to move material to suppliers who need it for shipment to the East Coast or through the Susquehanna pipe line (Sun).

Vandeveer received authorization from Ralph K. Davies, deputy petroleum administrator, to determine which suppliers shall deliver house-brand to suppliers needing help. Consideration in such instance will be given to most efficient use of transportation facilities and cognizance will be taken of existing commercial relationships.

The existing order covering distribution of housebrand in the Middle West is petroleum distribution order No. 20, which was designed to insure that marketers and distributors get a fair share of the available gasoline and fuel-oil supply, so that all customers, in turn, might receive an equitable portion of these products. Davies' grant of authority to Vandeveer will waive PDO No. 20 in District 2.

Order No. 20 bans discriminatory practices such as differentiation in deliveries between customers because of trade classification, affiliation, ownership, operation, control or size; because of purchasing or selling methods; because of accessibility of transportation facilities; or through the imposition of special conditions not imposed on all other customers.

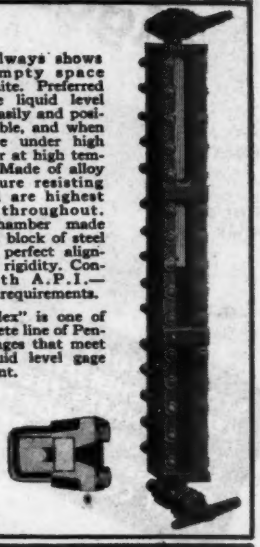
East Gets 115 Cars of Oil From Midland Rack Daily

MIDLAND, Tex.—Approximately 115 carloads of crude oil are being moved to the East Coast daily by rail from the Midland loading rack of Atlantic Pipe Line Co. This is the equivalent of two full trains. No crude is being shipped from here to Pacific Coast refineries, most of which are not equipped to handle the sour production of this region efficiently. High-gravity sweet crude was expected to be moving by tank car from Atlantic's rack to the Atlantic seaboard this week.

PENBERTHY

"REFLEX"

DROP FORGED STEEL LIQUID LEVEL GAGES



Liquid always shows black—empty space shows white. Preferred where the liquid level must be easily and positively visible, and when liquids are under high pressure or at high temperature. Made of alloy temperature resisting steel and are highest quality throughout. Liquid chamber made from solid block of steel to assure perfect alignment and rigidity. Conform with A.P.I.—A.S.M.E. requirements.

The "Reflex" is one of the complete line of Penberthy Gages that meet every liquid level gage requirement.

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DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

For Rugged, Year 'Round Service . . . Anywhere . . .

PATTERSON STEELWORK

Patterson Steel Company's personnel and plant facilities have been all-out in the war effort since Pearl Harbor. If we've been unable to take care of your requirements and you've been getting along with substitutes, we can again fill your orders . . . with steel—non-inflammable, safer, enduring. Our work on government projects has broadened our experience and increased our plant facilities for serving you better.

If you need Steel warehouse material, contact Patterson—The Largest Stocks South of St. Louis assure you a greater selection and faster service.

For rugged, year 'round service, let us figure with you on your oil field equipment from skids to stairs—pumping units, welding sleeves, AND—Any type of sectional steel buildings in any height, width or length in multiples of two feet.

DESIGNS AND ESTIMATES FURNISHED WITHOUT OBLIGATION

Since 1920

PATTERSON STEEL COMPANY

TULSA, OKLAHOMA

Tube Borium Keeps 'em digging

DULL IN 3 DAYS
STILL SHARP AFTER 30 DAYS
STOODY TUBE BORIUM* KEEPS DITCHER TEETH SHARP ... ELIMINATES FREQUENT SHUT-DOWNS FOR TOOTH CHANGES ... CUTS REPLACEMENT COSTS UP TO 75%

The two ditcher teeth pictured above were used on the same machine and operated under identical conditions.
The unprotected tooth at the top had to be sharpened every three days and was too short for further service after six sharpenings.
But the Borium-protected tooth at the bottom operated for 40 days and wore only ½". It was simply resharpened in the forge, retipped with Tube Borium, and put back on the ditcher for another 40 days' service.
Before the tooth was finally worn out, it had operated a total of 120 days!
Tube Borium makes such savings possible because the deposits represent the ultimate in wear resistance and the ability to cut hard earth formations.

*Stoody Tube Borium is supplied in rods of 1/8", 5/32", ¼" and 3/8" diameters and is available for either oxyacetylene or D.C. electric application. Prices and specifications are yours for the asking.

These tungsten carbide particles do not melt when tube is applied but are held in suspension in a mild steel matrix forming a deposit resembling coarse sandpaper.

Send for free booklet on TUBE BORIUM, showing sizes and styles of rods and recommended methods of application.

STOODY COMPANY
1138 West Slauson Ave., Whittier, Calif.

STOODY HARD-FACING ALLOYS
Stop wear . . . Eliminate Repair

PIPE LINES

Construction Starts on Ohio's Indianapolis Line

Construction crews began work this week on Ohio Oil Co.'s 115-mile 8-in. products pipe line from Robinson, Ill., to Indianapolis, Ind.

The general contractor, Sheehan Pipe Line Construction Co., and the welding contractor, H. C. Price Co., will handle the main line with two spreads. Roy Whitworth is in charge of the Sheehan company spread, starting east from Robinson, and Art Guinn for the one going west from Speedway near Indianapolis. Field offices have been established at both places. Another crew will be engaged in laying the Wabash River crossing. Specifications call for coating and wrapping.

Kansas Consolidated Project to Be Considered in 1945

Kansas Consolidated Gas Corp., a subsidiary of Consolidated Gas Utilities Corp., is deferring consideration of a pipe line from Hugoton to Wichita, Kans., until the spring of 1945. Changes in the war situation may bring conditions which will be more favorable for construction.

Officers of the Kansas Consolidated company are: E. C. Joullian, president; Norman Hirshfield, vice president, and Conrad C. Mount, secretary, who are located at Oklahoma City as well as C. S. Worley, purchasing agent. The resident agent is C. D. Reasor, 411 Beacon Building, Wichita.

Champlin Products Line Case Against ICC Postponed

Suit of the Champlin Refining Co., Enid, Okla., against the Interstate Commerce Commission, asking for a suspension of a valuation order handed down by the commission, was continued until October 12 when it came up for hearing September 8 in federal court.

The refining company contended a ruling of the ICC holding it was a common carrier and subject to the provision of the ICC was arbitrary and in excess of the power of the commission.

The suit pertains to a pipe line running from the company's Enid refinery to Rock Springs, Iowa. The decree in question was handed down by the commission December 14, 1942.

Cities Service Prepares For Shidler-Caney Line

Preliminary to laying a 52-mile 16-in. line from Shidler, Okla., to Caney, Kans., Cities Service Gas Co. is reported to have issued specifications with a request for bids from contractors to be submitted September 25. It is expected that pipe will begin to arrive late in October or early in November. In addition to the Shidler-Caney line, a 6½-mile 16-in. line to connect two existing gas lines is being planned to facilitate transmission to Craig and Welda, Kans., underground storage.

Extensive Pipe Laying Is Being Discussed

With the prediction made by Tennessee Gas & Transmission Co. that pipe laying for its 1,265-mile project will be completed by October 1 and that testing will be completed in time to commence transmission of gas by October 15, the windup of construction of this huge project is in sight.

Certain spurs and extensions for which applications are pending before Federal Power Commission or which were included in the original plan submitted to FPC will call for additional construction. These include a total of 97 miles of 8-in., 10-in. and 16-in. spurs to serve Russellville, Ky., to be built by Kentucky Natural Gas Co., to Louisville, Ky., to be built by Louisville Gas & Electric Co., and to Nashville, Tenn., to be built by Tennessee Natural Gas Lines, Inc.

A 200-mile extension of the Tennessee Gas & Transmission Co. project at the Corpus Christi, Tex., end as well as looping to provide for increased demands are discussed as possibilities which will require consideration in the near future.

In looking forward to pipe-line construction on a large scale, at-

tention is being given to prospects for a line from the Hugoton pool in Kansas and Oklahoma, to California. Much planning is reported to have been done by Pacific Lighting Corp. for the California system which may utilize 26-in. pipe.

Colonial Beacon Terminal Site Is Being Selected

Two tentative sites have been selected by Colonial Beacon Oil Co. for a terminal at the north end of the 35-mile products line of 4-in. and 6-in. from Everett to Methuen, Mass., in the vicinity of Lawrence. Either site in the Methuen area will require rezoning and the relocation of several miles of right-of-way. All materials for the project have been ordered. Some of the 4-in. pipe has been delivered.

Memphis Natural Seeks Pipe-Line Expansion

MEMPHIS, Tenn. — A Federal Power Commission hearing on a Memphis Natural Gas Co. application to enlarge its facilities from here to Monroe, La., continued this week with the principals informed of possible new legislation in the natural-gas field.

Chief Trial Examiner Frank A. Hampton announced yesterday that the FPC soon will begin public hearings for information "to aid in the enforcement of the Natural Gas Act and . . . to serve as a basis for possible recommendations to Congress for further legislation."

Hampton also took cognizance of charges that the FPC overstepped its authority in dismissing the firm's first petition on grounds the "use of gas should be limited to domestic, commercial and superior industrial uses"—which would bar gas for firing boilers.

Said he: "There was no intention of using the Memphis case to take any new jurisdictional steps on any broad question of natural policy."

But David Heath, assistant attorney general representing the Texas Railroad Commission, said: "With all respect to the FPC, we feel FPC has gone outside its jurisdiction and is encroaching upon the rights of the states in the first decision."

Hampton interrupted to repeat FPC contemplated no precedent to come from the hearing. Heath continued:

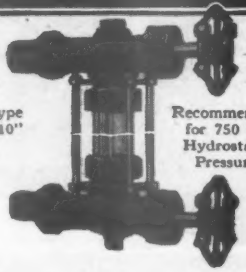
"I repeat that in the opinion of the Railroad Commission of Texas, this case is going to have an important effect on the gas situation in Texas."

The company has asked permission to lay more pipe lines in Mississippi and Arkansas on the grounds that present facilities are inadequate "to permit service to users at times of extraordinary weather conditions."

Sinclair's Wyoming Work Is Half Completed

The 29-mile project consisting of 20 miles of 8-in. and 9 miles of 6-in. in connection with the crude oil system of Sinclair Refining Co. near Casper, Wyo., is reported to be approximately half completed. The work was contracted by Burt Landon.

PENBERTHY
DROP FORGED STEEL
LIQUID LEVEL GAGES



Steel construction throughout with stainless steel interior trim. Automatic shut-off is positive and instantaneous; stainless steel balls shut off the flow of liquid when glass breaks. Heavy duty stuffing boxes, union connections, offset construction facilitate cleaning and simplify glass replacement. Conform with A.P.I.—A.S.M.E. requirements.

This is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

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General Contractors
PIPE LINES
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FIT EXACTLY INTO YOUR REQUIREMENTS for MAIN and FIELD LINE DITCHING or for STRIPPING PIPE

No matter where you put them, sticky mud, rocky or sandy ground or rough terrain, "CLEVELANDS" deliver Top Performance.

THE CLEVELAND TRENCHER COMPANY
"Pioneer of the Small Trencher"
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NIGHT or DAY
in any Weather!

No delays when you join pipe with Dressers! Expansion and contraction automatically absorbed. Work goes ahead all along the line—night or day—in any weather.

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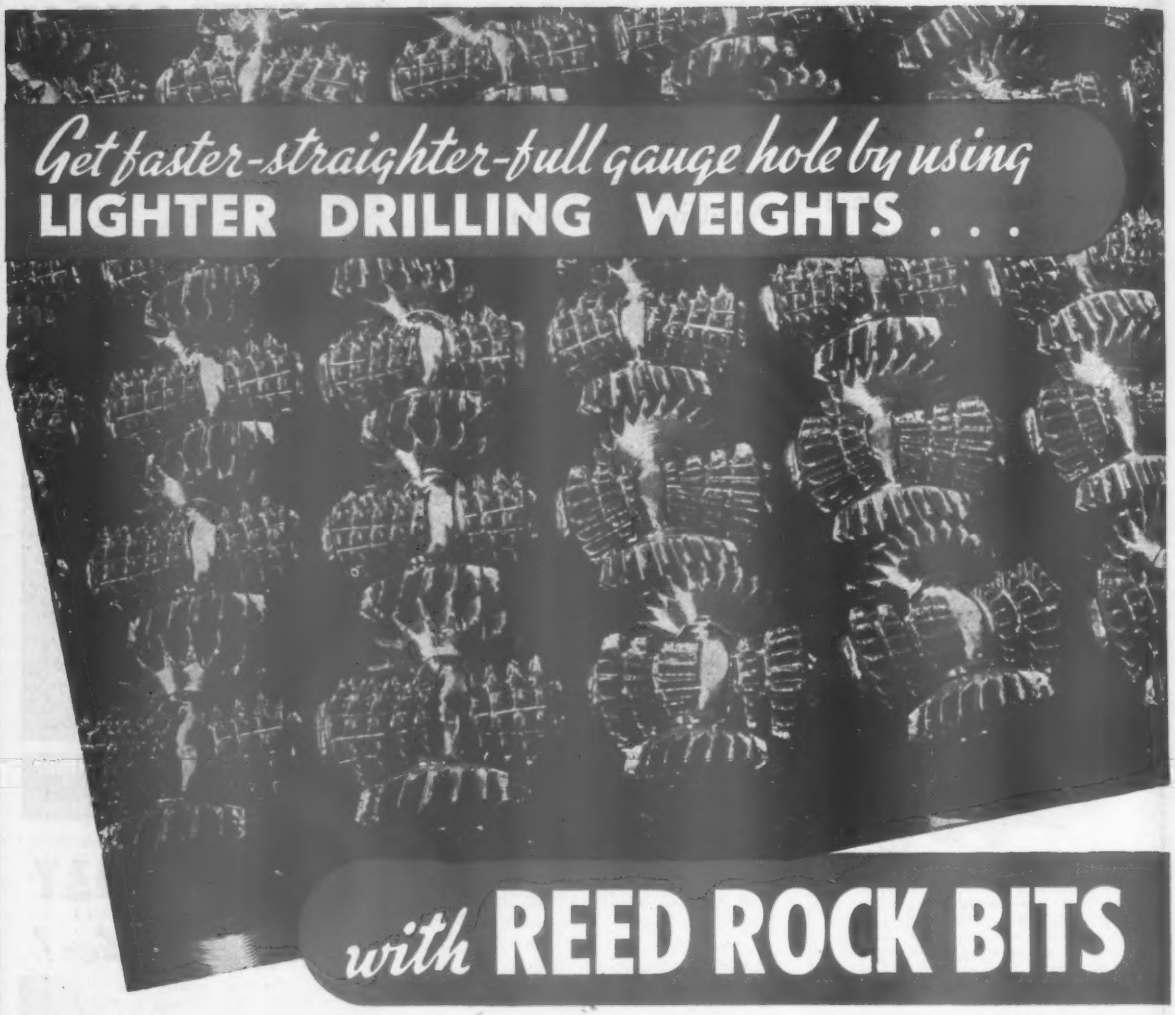
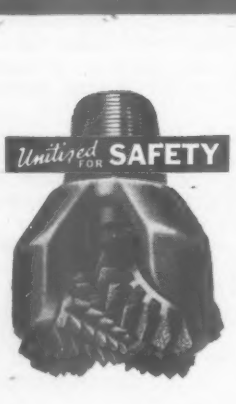


Get faster-straighter-full gauge hole by using LIGHTER DRILLING WEIGHTS . . .

with REED ROCK BITS

Reed Rock Bits are designed to produce a chipping, tearing action on the formation and the use of lighter drilling weights will permit the cutter teeth to perform this function more efficiently. Strength of construction, too, is provided for in the cross roller principle of design which holds the cutters securely in the cutter head. All cutter teeth and gauge bevels are hard faced with "Reedite" for wear resistance, and the replaceable slush nozzle permits selective cutter cleaning action on the derrick floor.



New and improved Reed Rock Bit cutter assemblies are continually being developed. These are the first tested on the Reed Rotary Drilling Machine, which simulates actual drilling conditions of weight, rotary speeds, and circulating muds. Final testing is done in actual drilling operations to assure efficient, dependable performance.

Reed

REED ROTARY DRILLING TOOLS

ROLLER BIT COMPANY
HOUSTON 1, TEXAS

Exploration and Drilling

Week's Highlights

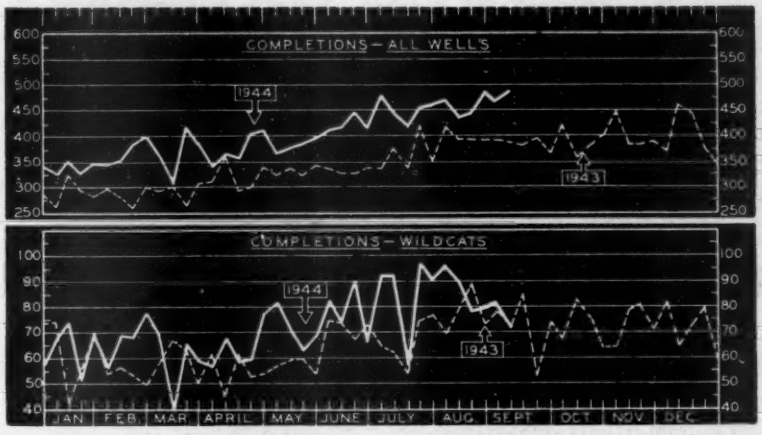
WYOMING has come through with another Tensleep sand discovery, the fifth new Tensleep pool in 1944 to date; or the sixth, if the 14-year delayed offset to the mudded-in discovery well on the Pitch Fork anticline is considered a 1944 discovery.

Continental Oil Co.'s third well on the Gebo dome in Hot Springs County, 3 Gebo unit, SW SE NW 23-44n-95w, flowed 1,402 bbl. of 26° gravity oil from the Tensleep at 4,880-4,983 ft. The first well on this structure, NW NW SE 23-44n-95w, was a good discovery well in the Embar and did not test the Tensleep. No. 2, north offset to No. 1, drilled through the Embar and tested the Tensleep, with poor results, then plugged back and is producing from the Embar.

The 1944 discoveries to date are: (1) Garland Dome, Big Horn County, discovery location in 32-56n-97w; (2) Pitch Fork, Park County, offset location in 11-48n-102w, where the discovery well was drilled 14 years ago and mudded-in for lack of market outlet; (3) Little Buffalo Basin, Park County, discovery location in 13-47n-100w; (4) Gebo Dome, described above; (5) Steamboat Butte, Fremont County, discovery location in 31-4n-1w; and (6) Spindletop in Natrona County, discovery location in 32-30n-81w.

There is special significance in that the above list shows the locations from north to south in the northwest part of the state, plus Spindletop in the central part. The Big Horn Basin now has Tensleep discoveries studded around the rim and there is no question but that deep-basin testing will be undertaken with considerable confidence, wherever geophysical and other geological information indicates good structural possibilities. However, Spindletop shows that Tensleep possibilities are worth testing in other parts of the state.

Steamboat Butte is the only discovery that can be classified as deep by modern standards, and it is not excessively so, the pay there being at 6,772-7,034 ft. The pay depth is 2,224-68 ft. at Spindletop; 3,515-3,722 ft. at Pitch Fork, 4,314-4,436 ft. at Garland, 4,785-4,965 ft. at Little Buffalo Basin, and 4,887-5,103 ft. at Gebo.



Solid line charts current weekly completions

COMPLETIONS IN ALL FIELDS . . .

Week ended September 9, 1944

	Oil	Gas	Dry	Total	Footage	Total Comp. to date 1944	1943
N. Y., Penna., W. Va.*	55	20	8	83	146,491	2,315	2,364
Ohio	2	14	13	29	75,794	675	608
Indiana	2	0	3	5	8,971	158	158
Kentucky	14	1	10	25	35,871	495	275
Illinois	21	0	10	31	88,404	1,253	1,196
Michigan	8	3	3	14	34,566	434	401
Kansas	22	0	20	42	145,264	1,244	1,115
Nebraska, Missouri, Iowa	0	0	0	0	0	22	30
Oklahoma	28	2	17	47	211,283	1,189	823
Texas:							
North Central	15	2	15	32	104,488	1,016	989
West	31	1	4	36	158,726	1,047	586
Panhandle	2	1	0	3	10,564	163	127
Eastern	5	1	5	11	68,207	222	196
Gulf Coast	12	3	15	30	194,662	827	311
Southwest	4	0	6	10	38,322	492	629
Total Texas	69	8	45	122	574,969	3,767	2,838
Louisiana:							
Northern	1	1	6	8	25,911	212	219
Southern	5	0	1	6	67,821	331	254
Total Louisiana	6	1	7	14	93,732	543	473
Arkansas	4	0	0	4	18,331	154	173
Mississippi	1	0	6	7	48,931	97	58
Southeastern States	2	0	3	5	28,342	30	†
Montana	5	2	1	8	20,266	245	151
Wyoming	2	0	0	2	7,908	113	91
Colorado-Utah	0	0	1	1	3,600	23	18
New Mexico	6	0	2	8	31,915	270	154
California	38	2	2	42	134,878	1,358	908
Total United States	285	53	151	489	1,709,516	14,385	11,834
Total previous week	271	63	137	471			
Total Sept. 11, 1943	213	42	130	385			

*Does not include 46 pressure wells. †Included in total shown for Mississippi.

EASTERN TEXAS

Hopkins County Wildcat Passes Up Bacon Lime Show

DALLAS.—Humble Oil & Refining Co. 1 C. B. Nichols, southeastern Hopkins County wildcat, and currently the most promising of the deep operations now under way in East Texas, was drilling ahead below 7,993 ft. in hard sand with no additional shows of consequence reported below the Bacon lime, topped at 7,860 ft., and which had approximately 20 ft. of saturation.

Van Zandt County.—Texas Co. has made location for a new wildcat test, 1 J. F. Stout, approximately ½ mile north and slightly west of the company's 1 Easley, dry deep test, 2½ miles southwest of Tundra. The new test is 3,050 ft. from southwest and 1,600 ft. from northwest lines of the N. T. Dickerson Survey. Northern Ordnance Co. 1 Shelton, Martin's Mill area, recovered only drilling mud with no shows of gas or distillate on a drill-stem test at 8,256-8,300 ft. and was past 8,472 ft. with no shows.

Henderson County.—Ohio Oil Co., et al 1 Coker, in the J. M. Cobasa Survey, was drilling below 9,056 ft. in lime and shale with no shows reported. Two new wildcats were announced for Henderson County. One is Lone Star Production Co. 1 R. H. Lee, 2½ miles north of Athens, to go to 10.000 ft., spotted 660 ft. from east and 330 ft. from north lines of the B. C. Walters Survey. The other is Texas Co. 1 George M. Morse, 1 mile south of Chandler, 2,120 ft. from west, 5,150 ft. from north lines of the S. Calderson Survey.

Cherokee County.—W. H. Foster et al 1 Bowling, Lone Star area wildcat, was drilling past 8,017 ft. It had a small show of oil and slightly porous lime at 7,980-7,900 ft.

EAST TEXAS WILDCAT COMPLETIONS

Henderson County: C. L. Shive 1 R. Johnson heirs, Geo. J. Johnson Sur., 1 mi. N Phanton, elev. 284 ft., Austin chalk 2,520-3,050 ft., Woodbine 2,480 ft., dry, TD 3,535 ft.

Red River County: Oscar Donnelly, Tr., 1 Ross Mitchell, A. J. Witt Sur., 2½ mi. S Allen Mill, elev. 411 ft., Goodland 986-1,016 ft., Paluxy 1,040-50 ft., anhydrite 1,768-70 ft., dry, TD 2,161 ft.

The Texas Co. 1 H. O. Solomon, W. E. Edwards Sur., 5 mi. SW Annona, elev. 347 ft., Woodbine 1,800-30 ft., Goodland 2,690-2,720 ft., Paluxy 3,790-3,820 ft., massive anhydrite 3,790-3,910 ft., Cotton Valley 5,050-80 ft., probable top of Paleozoic 6,025-40 ft., dry, TD 6,150 ft.

Van Zandt County: The Texas Co. 1 J. M. Easley, N. T. Dickerson Sur., 3½ mi. S Jackson, elev. 605 ft., Paluxy 6,566-15 ft., anhydrite zone 7,530-60 ft., top massive anhydrite 7,730-40, base massive anhydrite 7,909-19 ft., Pettit 8,497-8,507 ft., Travis Peak 8,622-27 ft., dry, TD 9,116 ft.

SOUTH LOUISIANA

West Extension for Cankton Field

NEW ORLEANS.—Danciger Oil & Refining Co. has completed its first well, and extended production westward, at the 1 Alice Cormier Prejean, Section 13-8s-3e, in the Cankton field of St. Landry Parish. Total depth is 9,727 ft. with casing set on bottom and perforations at 9,688-9,704 ft., six shots per foot. It flowed 478 bbl. on 22-hour gage, through a 10/64-in. choke, tubing and casing pressure equalized at 1,725 lb. Gravity was not reported.

Union Sulphur Co. 3 J. P. Gueno, Section 51-8s-2e, at Branch in Acadia Parish, is shut in, being killed to install surface pressure equipment before testing. Perforated from 11,085-90 ft., hole was washed some but pressures rose rapidly and the well had to be shut in before cleaning. Total depth is 11,316 ft., with sand showing oil from 11,044-104 ft., 5½-in. liner from 10,478-11,125 ft.

SOUTH LOUISIANA WILDCAT COMPLETIONS

Cameron Parish: Humble Oil & Refg. Co. 1 State Lease 568, Rockefeller Reserve, 30-16s-3w, Deep Lake area, dry at 12,003 ft.

St. Charles Parish: Pure Oil Co. 1 General American Transportation Corp., discovery well, Good Hope area, Sec. 7-12s-8e, TD 10,171 ft., perf. 7,830-38 ft., PT 340.08 bbl. daily 10/64-in. choke, gas-oil ratio 583:1, tubing pressure 1,320 lb., gravity 35.0, 0.2 per cent water.

SOUTHWEST TEXAS

Victoria County Discovery Flowed 111-Bbl. Potential

CORPUS CHRISTI.—Lyons & Prentiss 1 Keeran Estate in Martin de Leon Survey, discovery well north of Keeran gas production and 17 miles south of Inez, in Victoria County, flowed a potential of 111 bbl. daily on ¾-in. choke from the 3 perforations at 4,754-58 ft., tubing pressure 800 lb., casing pressure 1,300 lb. Gravity 28, no water, gas-oil ratio 492 to 1. Total depth is 7,020 ft. with 5½-in. casing set at 5,383 ft.

A production test is being run by the Moran Co. in the former Jack Frazier 1 Lell et al, wildcat in Lavaca County, about 4½ miles southwest of Hallettsville in James Kerr Survey 9. Perforations were made at 5,914-17 ft. and well is still cleaning itself on production test, with no gage yet available. A drill-stem test run in the perforations had flowed about 7 bbl. of 42-gravity oil per hour through ¼-in. choke, with 1,100 lb. working pressure. This well had been drilled by Jack W. Frazier et al to 7,960 ft. where it developed a fishing job, after which a string of 5½-in. casing was set by the original operators and the hole temporarily abandoned early in August. The Moran Co. then took over and went in for the present test. The 5½-in. casing was reported landed at 5,930 ft.

Henderson Coquat 3 L. A. Reagan, wildcat in S. McGloin Survey, Live Oak County, about a mile south of Oakville, ran drill-stem test from 6,940-47 ft., using 1,000-ft. water cushion, open 40 minutes, ¼-in. choke top and bottom, showed 300 lb. top pressure, flowed in 29 minutes, and recovered 225 ft. of gas-cut mud, water cushion, 50 ft. condensate and 40 ft. mud and water, 1,200 lb. flowing pressure, shut-in pressure not available. It then cored 8 ft. more gas sand and attempted a drill-stem test from 6,951-57 ft. with 1,100-ft. water cushion but packer failed to hold. Operators were still trying to get a test at this level.

Phillips Petroleum Co. 1 Virginia Garcia (Texon), wildcat in Zapata County, about 20 miles south of Aguilares, ran log to total depth 7,296 ft. and is dry. It had a sand carrying oil odor at 5,008-17 ft. but picked up nothing of commercial value.

Houston Oil Co. of Texas 6 Newman fee, Cosden area of Bee County, is dry at total depth 7,503 ft. after running log which failed to indicate commercial possibilities. A drill-stem test previously run at 7,111-19 ft. had recovered 2 stands of oily mud, 10 stands of salt water, 3 lb. working pressure, ¼ and ⅜-in. chokes, in 20 minutes.

SOUTHWEST TEXAS WILCAT OPERATIONS

Bee County: W. Earl Rowe 1 John C. Beasley, William Allen Sur., 2 mi. W of Tynan, dry at 4,875 ft.

Goliad County: Guy E. Green et al 1 Sol Parks, Manuel de la Pena Sur. 31, 3 mi. S of Fannin, dry at 4,685 ft.

Jim Wells County: Jay Simmons 1 J. H. Austin, 6 mi. NW of Alfred, J. W. Fogg Sur. 12, dry at 5,520 ft.

Live Oak County: Smith & Story 1 C. T.

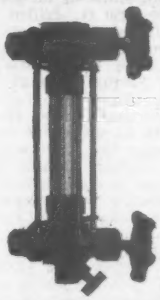
DAILY AVERAGE PRODUCTION FOR WEEK

	Sept. 9 Crude oil	Distillate, allied products	September PAW quota all oils	Sept. 2 crude oil
Arkansas	81,150	4,500	82,900	80,350
California	860,350	51,100	936,700	864,750
Colorado	8,700	.....	8,000	8,600
Eastern	72,600	6,100	81,000	69,500
Illinois	208,600	11,500	222,000	200,650
Indiana	14,950	.....	14,000	13,250
Kansas	254,300	4,300	279,700	266,250
Kentucky	26,500	2,500	27,700	25,200
Louisiana	362,150	35,000	385,000	362,900
North Louisiana	73,750	.....	.....	73,800
South Louisiana	288,400	.....	.....	289,100
Michigan	49,500	400	51,500	50,200
Mississippi	46,800	.....	45,000	46,400
Montana	20,800	200	24,300	20,200
Nebraska	900	.....	1,000	900
New Mexico	105,850	5,500	115,500	106,050
Oklahoma	339,550	27,000	370,800	338,200
Texas	2,156,050	138,000	2,303,000	2,108,450
East Texas	370,950	.....	.....	371,850
East Central Texas	149,800	.....	.....	147,550
North Central Texas	147,750	.....	.....	148,400
Texas Panhandle	98,700	.....	.....	98,750
West Texas	504,050	.....	.....	485,100
South Central (S. A.)	19,350	.....	.....	19,250
South Texas (Laredo)	79,050	.....	.....	77,500
Lower Gulf Coast	243,350	.....	.....	224,800
Upper Gulf Coast	543,050	.....	.....	535,250
Wyoming	88,050	3,000	103,200	86,950
Total United States	4,696,800	289,100	5,051,300	4,648,800
Change from previous week	up 48,000	.....	.....	.....
Total production January 1-September 9, 1944				1,138,873,150 bbl.
Same period last year				1,006,087,970 bbl.

PENBERTHY

"ALL IRON"

LIQUID LEVEL GAGES



Body made from a special high strength alloy iron, shanks alloy steel and trim stainless steel. Extra heavy construction throughout, automatic and positive shut-off if glass breaks, heavy duty stuffing boxes. Conform with A.P.I.—A.S.M.E. requirements.

The "All Iron" is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

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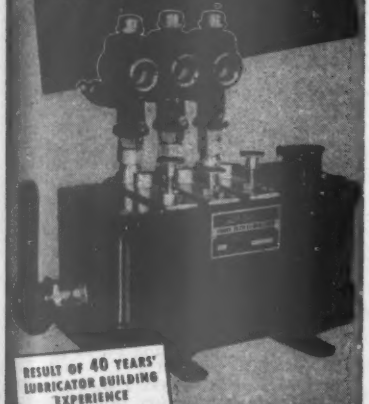

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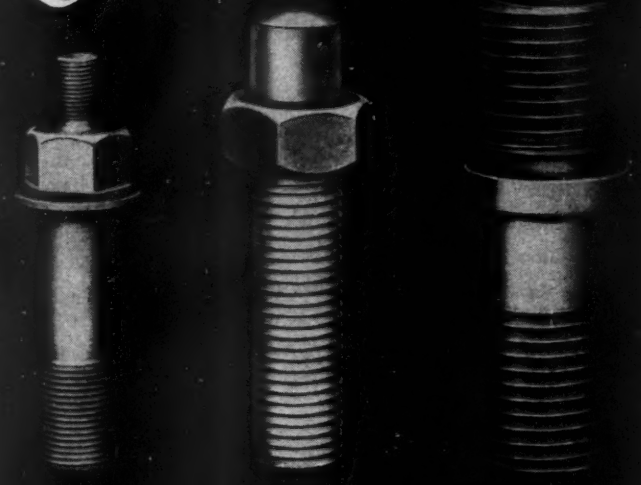

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Griffin, M. B. Kivlin Sur., 7 mi. W of Mathis, dry at 1,950 ft.

Starr County: Sun Oil Co. 1 E. G. Esslinger, Pedro Longoria Sur., 3 mi. W of Sam Fordyce field, dry at 5,012 ft.

Zapata County: Phillips Pet. Co. 1 Virginia Garcia (Texon), Carralitos subd. of J. V. Borrego grant, Lot 2, 20 mi. S of Aguilares, dry at 7,296 ft.

Victoria County: Lyons & Prentiss 1 Keeran Estate, South Inez discovery, Martin de Leon Sur., 17 mi. S of Inez, TD 7,020 ft., perf. 24/4,754-58 ft., PT 111 bbl. daily 8/64-in. choke, gas-oil ratio 492:1, TP 800 lb., CP 1,600 lb., gravity 29, no water.

APPALACHIAN FIELD

Largest of Recent Strikes Completed, Fayette County

PITTSBURGH.—In Birch district, Braxton County, West Virginia, Philadelphia Oil Co. completed 10 Gertrude B. Howell in the Salt sand, total depth 1,723 ft., as a 50-bbl. oil well

In Nicholas County, Columbian Carbon Co. is completing 3 C. C. Dickinson in Jefferson district, a large untested acreage, and it is gaging 948,000 cu. ft. gas with the Big Lime gas at 1,621 ft. and the tools now at 1,659 ft. The two other tests on the tract were 1,300,000 cu. ft. gas and 3,397,000 cu. ft.

In Fayette County, southwest Pennsylvania, Greensboro Gas Co. completed a test on John Hogsett, German Township, as a gas well gaging 4,620,000 cu. ft. with the Big Injun topped at 2,026 ft. and gas 2,121 ft. and total depth of 2,128 ft. This is the largest of recent strikes. In this district but at a lower elevation, Boyd Oil & Gas Co. completed a test on Joseph Desco good for 904,000 cu. ft. gas with Big Injun sand topped at 1,264 ft., gas at 1,281-87 ft., and total depth 1,300 ft. It had a rock pressure of 608 lb.

In Armstrong County, Equitable Gas Co. completed a fair well, 4 Allegheny Improvement Co., in South Buffalo Township with a gage of 1,200,000 cu. ft. with the Hundred Foot gas at 1,335 and 1,345 ft.

In Greene County, H. D. Freeland et al completed a test on W. M. Hoy good for 1,400,000 cu. ft. gas from the Injun sand topped at 1,989 ft., gas at 2,107-2,116 ft., and total depth at 2,116 ft.

CANADIAN FIELDS

Turner Valley Outpost Finished at 10,238 Ft.

CHATHAM.—Turner Valley outpost well to the north and east, British Dominion 6, LSD 6, 7-21-3w5, finished at 10,238 ft. with Madison first contacted at 7,910 ft. made 18 bbl. an hour from the upper lime. Drill went through a second lime sequence after faulting, and lower lime has still to be tested.

Taber. — Major-Taber 3, LSD 14, 9-9-17w4, finished at 3,245 ft., started a flowing well at 300 bbl. daily. Location is south and west of the original field, and ¼ mile from Major 1, a gasser with about 35 bbl. daily.

South Turner Valley. — Major-National 16, LSD 4, 9-18-2w5, southern outpost completion in Turner Valley, started at 60 bbl. an hour after first acidization.

Saskatchewan. — In southern Saskatchewan, Norcanols-Radville 2, LSD 16, 36-5-19w2, finished below 5,071 ft., abandoned.

PERMIAN BASIN

Yoakum County Wildcat Prepares to Deepen

MIDLAND. — Skelly Oil Co. 1 W. S. Hodges, Yoakum County wildcat in NW NW of Section 446, Block D, about 6 miles northwest of the small Bond-Bohagan West pool discovery producer, was preparing to drill ahead on its original 7,800-ft. contract after halting at total depth 5,361 ft. to make a production test. At that depth it swabbed some free oil and a small show of water, then set a jelly seal to 5,310 ft., and then acidized with 1,500 gal., after which it swabbed 102 bbl. of fluid in 24 hours, 4 per cent water, 98 per cent oil; shut in overnight. When it opened it flowed 18 bbl. of oil in 2 hours and died. If no production is obtained in deepening to 7,800 ft., operators may plug back to this zone and test further.

Ector County. — Shell Oil Co., Inc., and Cities Service Oil Co. 1 TXL, new Devonian lime discovery, was drilling below 8,150 ft., in lime, out of the Devonian section which it topped at 7,860 ft. and based around 8,029 ft. In addition to previously reported tests in the Devonian section which definitely indicated flush production, two more drill-stem tests have been made. The first, from 7,978-99 ft., open 1 hour, showed a steady gas blow, recovered 392 ft. of oily mud and 50 ft. of oil; the second, from 7,998-8,029 ft., open 1 hour, recovered 3,000 ft. of clean oil, 93 ft. of oily mud and 90 ft. of drilling mud.

Martin County. — Gulf Oil Corp. MM-1 University is a new location for an obligatory 5,600-ft. test on a block of Texas University leases bought at the recent university lease auction by Sterling Holloway, of Fort Worth, and subsequently assigned to Gulf. The location is in the NE NE Section 2, Block 7, University Land.

Ward County.—Standard Oil Co. of Texas has staked its 1-X D. B. Durgin et al as a 10,000-ft. Ellenburger test, the first Ordovician venture in the South Ward field. It is 1,980 ft. from southwest and southeast lines of Section 15, Block 34, H&TCRR Survey, being about 7 miles northwest of Gulf's Silurian lime producers in the Shipley deep field.

Lamb County.—Woodley Petroleum Co. 1 Bird, in Section 66, Block 7, about 6 miles northwest of Humble Oil & Refining Co. 1 Jackson, topped anhydrite at 1,730 ft., San Andres lime at 3,130 ft., has cemented protection string of 9⅝-in. pipe at total depth 3,526 ft. before drilling ahead. On the San Andres lime top it appears to be about 30 ft. lower structurally than Humble 1 Jackson, which is now preparing to test a series of shows.

WEST TEXAS WILDCAT COMPLETIONS

Crane County: The Texas Co. 1-A C. W. Hobbs, Sec. 46, Blk. 35, H&TC Sur., 5 mi. W McCamey, elev. 2,374 ft., San Andres 2,115 ft., Silurian 5,685 ft., TP 5,300 ft., PB to 5,440 ft., flowed 434 bbl. day through 1-in. tubing choke, gas-oil ratio 1,900 to 1, gravity 45, TD 6,020 ft.

Pecos County: Debs Patillo 1 V. W. Crockett, Sec. 58, Blk. 10, H&GN Sur., 4 mi. S Lehn pool, elev. 2,449 ft., anhydrite 560 ft., TP 1,262 ft., pumped 26 bbl. day through 2-in. tubing, gravity 30.7, TD 1,207 ft.

Humble Oil & Refining Co. 1 O. Williams, Sec. 3, Blk. 114, GC&SF Sur., 11 mi. NW Stockton, elev. 2,845 ft., anhydrite 1,490 ft., TP 2,840 ft., PB to 2,892 ft., flowed 22 bbl. day through 16/64-in. tubing choke, gas-oil ratio 1,560 to 1, gravity 35.7, TD 3,604 ft.

Reagan County: Byrd-Frost, Inc., 1 University, Sec. 18, Blk. 2, University ladns, 4 mi. NW Big Lake field, elev. 2,678 ft., anhydrite 1,215 ft., salt 1,255 ft., Yates 2,080 ft., dry, TD 3,631 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Half a dozen deep Lea County tests are going steadily ahead but with no important shows reported. Gulf Oil Corp. 1 Drinkard, in Section 30-22-38, recovered 300 ft. of gas-cut drilling mud with a small show of oil on a drill-stem test at 5,130-5,250 ft., drilled ahead below 5,435 ft. Humble Oil & Refining Co. 1 Federal-Keinath, Section 8-21-38, was past 7,340 ft. in lime; Continental Oil Co. 2-B-23 Skaggs, Section 23-20-37, was drilling at 9,430 ft., lime and chert; Humble 1 Federal-Leonard, Section 12-26-37, is below 11,673 ft. in shale and dolomite; Phillips Petroleum Co. 4 Lea-Mex, an 8,000-ft venture in Section 17-17-33, topped anhydrite at 1,345 ft. and drilled ahead. Barney Cockburn 1 Wyatt-State, Section 33-17-33, was drilling at 6,839 ft. in lime with no additional shows reported. A mile west extension to the Vacuum field is being completed at Devonian Oil Co. 1 State in Section 32-17-34, for a small pumper after using acid on the pay zone between 4,675-4,729 ft.

Plymouth Oil Co. is starting a 7,000-ft wildcat in SW NW Section 13-15n-10w McKinley County, in northwestern New Mexico.

SOUTHEAST NEW MEXICO WILDCAT COMPLETIONS

Lea County: Humble Oil & Refining Co 1-O State, C NE NW 1-12s-34e, 10 mi NW Tatum, elev. 4,150 ft., dry, TD 4,994 ft.

Skelly Oil Co. 1-X State, C NW NW 9-21s-34e, elev. 3,723 ft., dry. TD 4,130 ft.

TEXAS PANHANDLE

AMARILLO.—Stanolind Oil & Gas Co 1 Herring, Oldham County wildcat, attracted attention last week when it cut a core logging an odor in samples at 7,245 ft. The core, from 7,245-59 ft., recovered only 6 in. of black shale, 1½ ft. of conglomerate granite wash, 6 in. of black shale and 6 in. of granite wash on the bottom, with no shows. It prepared to drill ahead.

A new gas well was brought in in Moore County, Jenny Rubin 1 W. H. Brown, in SE SE NW of Section 4, Block 2, G&M Survey, gaging 45,000,000 cu. ft. of gas from main gas sand at 3,307-3,424 ft., total depth.

TEXAS GULF COAST

Sun Completes Gas Well In Fig Ridge Area

HOUSTON.—Sun Oil Co. 3 Federal Land Co., Fig Ridge area of Chambers County, is completed as a gas well in 11ft perforation at 8,345-75 ft., open flow being 5,800,000 cu. ft. per day, shut-in tubing pressure 3,010 lb., gas-oil ration 77,800 to 1. On ⅛-in. choke it flowed at the rate of 887,000 cu. ft. daily, tubing pressure 2,800 lb. Total depth is 8,675 ft. with 5½-in. casing set on bottom.

Glenn H. McCarthy 1 T. Wiebelhaus north of North Winnie discovery well Chambers County, is reported to have shown gas condensate on test in perforations at 10,482-492 ft. Total depth is 10,645 ft., with 5½-in. casing set at 10,505 ft.

Texas Gulf Producing Co. and Tide Water Associated Oil Co. 1 G. C. Jackson at Jackson Pasture (or Double Bayou) Chambers County, flowed a potential of 95 bbl. daily through 3/16-in. choke, gas-oil ratio 8,800 to 1, from 10 perforations at 8,125-28 ft., tubing pressure 1,500 lb., casing pressure 2,925 lb., gravity 48.8, no

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water. Total depth of the hole is 8,904 ft., plugged-back depth 8,128 ft., top of sand 8,110 ft. This well is 2,640 ft. northeast of Crosby-Kirby 1 J. E. Jackson discovery gas-condensate well at Jackson Pasture.

American Republics and Houston Oil Co. of Texas 2 H&TC-fee, west of the discovery well at Beech Creek field, Hardin County, was completed as a gas well and shut in. No gage. Perforations at 6,295-6,316 ft. Total depth 10,218 ft., with no shows of interest in the Wilcox. Seven-inch casing set at 6,373 ft.

Humble Oil & Refining Co. is running 5½-in. production casing to set in the 2-B Donald and F. B. Duncan, wildcat in the Hungerford area of Wharton County. Total depth of the hole is 7,350 ft. and log was run to bottom. This wildcat is about 1½ miles northwest of Spanish Camp gas production.

British American Oil Producing Co. has moved rig off the 1 Ed Hurta et al, in Needville field, Fort Bend County, after running several flow tests into the tanks which are reported to have shown some salt water. Operator plans to move back on at a later date to rework in effort to shut off the water. This test is completed in perforations 6,026-32 ft., where it is good for about 100 bbl. daily on ½-in. choke, tubing pressure 950 lb.

UPPER GULF COAST WILDCAT COMPLETIONS

Fayette County: Phillips Petroleum Co. 1 Karl Rietz, Cistern area, in James Robinson League, dry at 3,005 ft.

Jackson County: Stewarts & Ralph A Johnston 1 Frank Koop, R. Musquez Sur., 6 miles southwest of Edna, dry at 7,178 ft.

Jefferson County: Shell Oil Co., Inc., et al 1-E McFaddin Trust, Henry Gentz Sur., dry at 8,198 ft.

Newton County: F. J. Anderson, Tr., 1 Ethyl Hendrix et vir, T&NO Sur., 6 miles south of Bon Weir, dry at 9,515 ft.

Wharton County: The Texas Co. 1 C. D Bergstrom et al, WCRR Sur. 37, 6½ miles northwest of Hillje, dry at 5,410 ft.

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CALIFORNIA

Amerada Adds Gas Field To List of Discoveries

LOS ANGELES. — Amerada Petroleum Corp. added a new gas field to its list of California discoveries this week by completing 1 Starkey fee flowing 22,000,000 cu. ft. of gas daily from an interval of 4,555-4,600 ft. This discovery is about 6 miles southeast of Dixon in Solano County. It was originally drilled in 1943 but work was suspended at 9,434 ft. and the hole remained idle until recently.

Up in the Kirby Hills in Solano County, Shell Oil Co., Inc., is having difficulty bringing a wildcat, 1 Lambie, in 25-4n-1w, under control following a blowout from 2,617 ft. This wildcat got away while the crew was pulling casing after finding a tight spot. The flow is estimated at about 20,000,000 cu. ft. with no apparent diminution in volume during the 3 days it has been blowing into the air. The gas is coming from a sand above the Eocene which has been found productive in the Sacramento Delta region.

Tide Water Associated Oil Co.'s next completion in the north Mountain View field in Kern County will probably be a gas well as on a temporary production test the well, 34 Wackeen in 18-30s-29e, flowed at a daily rate of 10,000,000 cu. ft. of gas and a spray of oil through an 8/64-in. bean from 4,392-4,444 ft. Flowing pressure was 750 lb. on tubing and 1,000 lb. on casing and shut-in pressure is 800 lb. on tubing and 1,800 lb. on casing indicating the presence of considerable gas.

Developments in the Bellevue field, discovered a few months ago by Superior Oil Co., have been unfavorable. Standard Oil Co. of California's 45-35 Robbins Community failed to find anything in the lower zone at 8,600 ft. and the hole is being plugged back. The company's 61-2 Brittain failed to find anything in either the upper or lower zone and drilling has been resumed in order to carry the hole down for a conclusive test. Superior's 56-35 Houghton also missed the oil sand in upper and lower zones and has been suspended at 8,250 ft. pending the outcome of work on Standard's deep test. Standard's deep test in the Coles Levee field is nearing the 15,000-ft. level and within another week or so should exceed the deep record of 15,004 ft. established by Continental Oil Co. at Wasco several years ago.

The first award under Navy's request for bids on 2,500,000 bbl. of Elk Hills oil went to Union Oil Co. of California, Shell Oil Co., Inc., General Petroleum Corp. and Mohawk Oil Co.

CALIFORNIA WILDCAT COMPLETIONS

Dixon wildcat district, Solano County: Amerada 1 Starkey fee, 2-6n-2e, flowed 22,000,000 cu. ft. gas, no oil, 12/64-in bean, TD 9,434 ft., PB 4,660 ft., perf. 4,555-4,660 ft., discovery well in new field 6 mi. SW of the town of Dixon.

South Belridge outpost well, Kern County:

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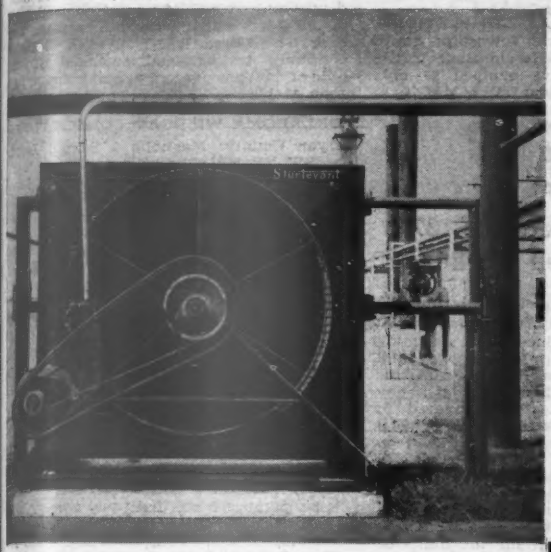

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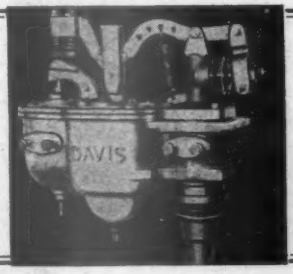

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Shell 17 F.K.L., 1-29s-21e, abandoned in gray sand, Mulinia 2,900 ft., Miocene 4,000 ft., only minor showings, was deep test to determine possibility of producing from Miocene, TD 5,490 ft.

MICHIGAN

Record Bonus Paid at Lease Auction

SAGINAW. — Choice state land acreage in the Arenac County area brought a record bonus at an oil and gas lease auction conducted in Lansing by the state Conservation Department.

Charles W. Teater, Saginaw independent, and Rowmor Corp. of Mount Pleasant, bid in the choice 40-acre lease in Adams Township for $54,000 as the department put leases to 60,000 acres on the block. The previous bonus record was $48,000, in 1937.

Currently the state's biggest producers are being developed in the Deep River field of Arenac County and of the week's 14 completions, the chief producer was the Ervin Major 1 Stawowy in Section 1 with an initial potential of nearly 150 bbl. per hour.

Seven other small producers also were recorded, including a 99-bbl. well listed as a wildcat in Fork Township, Mecosta County. There were three dry holes and in Goodwell Township, Newaygo County, three gas wells, each rating better than 10,000,000 cu. ft. per day, were completed.

Chippewa Township of Mecosta County came in line for extensive development as the state Conservation Department announced six of the 17 permits issued in the past week were for Chippewa Township, Mecosta County, where a good producer was completed last month. The permit list also included three each for Arenac and Montcalm counties, one each for Allegan, Barry, Ottawa, Saginaw and Van Buren.

MICHIGAN WILDCAT COMPLETIONS

Mecosta County, Fork Township: Smith Petroleum Co. 1 Harold Buss, C S½ NW NE 16-16n-7w, pumped 99 bbl., acidized, in Dundee; TD 3,781½ ft.

OKLAHOMA

W. Edmond Reaches 137 Producing Well Mark

LAST minute completions during the week brought the West Edmond field up to 135 Hunton producers, and including the two Bartlesville producers, a total of 137 producing wells. Pipe-line runs for the week averaged 24,800 bbl. per day from 131 wells connected, compared to 23,100 bbl. from 123 wells last week. The latest crop of completions continued to show flow potentials of from 50 to 100 bbl. per hour on 2 to 4-hour tests.

Two tests on the south end of the field are being watched closely as they are getting deep enough to check marker formations and may determine the limits of southward possibilities. Denver Producing & Refining Co. 1 Collett, NW NW 14-13n-4w, is drilling below 5,600 ft., and is reported checking about normal with wells to the north. Magnolia Petroleum Co. 1 Talbot, NW NW 28-13n-4w, 1½ miles south of production, is drilling below 5,400 ft. The Talbot test is 1¼ miles west and ¼ mile north of the old dry hole in 27-13n-4w that was drilled several years ago.

Garvin County.—Sinclair Prairie Oil Co. 1 Wright, SE SW NE 20-3n-3e, offset to same company's 1 Allred, a recent discovery, looks disappointing. It topped Simpson dolomite at 1,856 ft., had sand at 1,896 ft., cored from 1,877-1,918 ft., total depth, and on drill-stem test showed 1,600 ft. of fresh water with sulfur taste and odor. The Allred, in NE NW SE 20-3n-3e, continues testing, and swabbed 180-200 bbl. of low-gravity oil per day from pay zone at 1,898-1,918 ft.

OKLAHOMA WILDCAT COMPLETIONS

Bryan County: Magnolia 1 School Land, SW NE NW 6-7s-9e, dry, TD 5,308 ft.

Cleveland County: Mid-Continent 1 Harris "B," discovery, NE NE NW 32-10n-3w, flowed 600 bbl. through 1-in. choke from pay zone 8,010-60, TD 8,875 ft., Hunton 8,005 ft., Sylvan 8,370 ft., Viola 8,455 ft., dolomite 8,580 ft., Wilcox 8,830 ft.

Okfuskee County: Phillips & Viersen 1 Seran, NW NW NE 14-13n-7e, dry, TD 2,805 ft., Verdigris 2,785 ft.

Jackson County: Halas Petroleum 1 Carlisle, SW NW SW 7-1s-19w, dry, TD 2,110 ft.

Creek County: C. O. Buckles 1 Connor, discovery, SW SE NE 17-18n-10e, flowed 25 bbl. from pay zone 2,730-55 ft., TD 2,755 ft., sand 2,300 and 2,382 ft., Dutcher 2,730 ft.

L. B. Jackson 1 Smith, NE NW 9-18n-9e, pumped 5 bbl. from pay zone 2,765-80 ft., TD 3,083 ft., lime 2,755 ft., sandy lime 2,770 ft., Woodford 3,025 ft.

Fred Cotton 1 Lindsey, SE SE SE 33-15n-7e, dry, TD 4,220 ft., Wilcox 4,152 ft., second Wilcox 4,175 ft.

Wilcox 1 Watson, SW SW SE 27-15n-7e, dry, TD 3,265 ft., Inola 3,061 ft., Bartlesville 3,077 ft.

Nadel & Guseman 1 Sandlin, SE SE NW 8-14n-8e, discovery, pumped 27 bbl. from pay zone 2,450-69 ft., TD 3,922 ft., Prue 2,450 ft., Inola 2,865 ft.

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Bartlesville 2,910 ft., Woodford 3,730 ft., Viola 3,826 ft., Wilcox 3,872 ft., second Wilcox 3,900 ft.

ROCKY MOUNTAIN

Gebo Dome Definitely Proven for Big Production

DENVER. — The Gebo dome in Hot Springs County, Wyoming, in which Continental Oil Co. made a discovery in the Embar lime last December, has been definitely proven for big production in the Tensleep in its 3 Gebo unit, SW SE NW 23-44n-95w, ¼ mile northwest of the Embar discovery. On an 8½-hour test from the Tensleep through a 2-in. opening on the casing, it flowed 454 bbl. of black oil ranging from 23 to 26 gravity and at the end of the test it was flowing at the rate of 1,309 bbl. per day. It proves up another Tensleep pool on the rim of the Big Horn Basin. Total depth is 5,103 ft., top of Tensleep was at 4,887 ft., and the 7-in. was cemented at 5,098 ft.

Half Moon discovery still in doubt.—Husky Refining Co. 1 Krampert unit, NE SW NW 23-51n-102w, Half Moon structure, Park County, Wyoming, which cored saturation in the Embar and Tensleep and gave indications of a discovery, made a drill-stem test in the Tensleep with negative results. Testing is still under way.

Tensleep dry at Dry Creek.—Ohio Oil Co. 18 Northern Pacific, NE NE SW 3-7s-1e, Dry Creek field, Carbon County, Montana, a deep test drilled to 8,882 ft., is still plugging back and testing all horizons. It perforated the Tensleep with 32 shots at 6,872½-82½ ft., and on a pump test failed to recover any fluid. It then perforated the Embar with 90 holes at 6,830-60 ft., and that horizon tested dry. It then perforated the Sundance with 75 shots at 6,060-90 ft. and is testing.

Little Buck Creek-East Lance Creek.—Recent discoveries by Continental Oil Co. east of the Lance Creek field in Niobrara County, Wyoming, have been designated as being on two separate structures. The easterly discovery, 1 Wright, NW SW NW 25-36n-64w, and 1 Barrett, SE SW SW 24-36-64, drilling well, are in what will be known as the Little Buck Creek field. Its 1 Leach, SW NE NE 29-36-64, the discovery; 2 Government, SW NE SE 29-36-64, a producer; and 1 Mills, SW SE NW 27-36-64, a new operation, are in what has been designated the East Lance Creek field.

Big gasser in East Utopia.—Texas Co. 1 Nick Lass, NW SW SW 14-33n-4e, East Utopia district, Liberty County, Montana, encountered more gas just above the Madison lime and the well is estimated capable of making 25,000,000 cu. ft. a day. It is bottomed at 2,412 ft. and underreaming the 7-in. Location is 1¼ miles east of its 1 State, the oil discovery last fall, which had the top of the Madison at 2,578 ft., and pumped 20 bbl. per day.

Rangely field development.—Progressive development of the new Weber (Pennsylvanian) horizon in the Rangely field, western Colorado, in which California Co. has just completed its second producer, is getting away to a good start with two new operations. Newton Oil Co. has made a location for a Weber sand well in its 1 Government Lot 10 (NW NE) 8-1n-102w. Husky Refining Co.-Barnsdall Oil Corp. 1 Government, C NE SE 23-1n-103w, is spudding to go to the Weber. California Co. is drilling two offsets to the discovery and Wasatch Oil Refining Co. 1 McLaughlin, NW NW NE 32-2n-102w, is a near completion.

Tertiary test in northwestern Colorado. Pacific Western Oil Co., joint with the Frontier Refining Co., has made a loca-

Easy Maintenance Is Built Into Amsco-Nagle Pumps . . . . . .

Ready accessibility for adjustments and repairs is a dividend-paying characteristic of Amsco-Nagle pumps. This feature, in many applications, is as valued by operators as is their ability to handle abrasive and corrosive liquids for maximum periods before requiring attention.

In designing Amsco-Nagle pumps, consideration was given the importance of accessibility for keeping down maintenance costs and reducing to a minimum each "time out" period.

Indicated in the illustration below (P-40-N) are three points of accessibility which add up to savings in time on adjustment and maintenance. This is an Amsco-Nagle 10" Type "T," frame 29, vertical discharge pump. The type "T" is a single stage, side action horizontal pump of high mechanical and hydraulic efficiency, with wide impeller clearance for free passage of debris-laden liquids, slime, sludge and slurry.

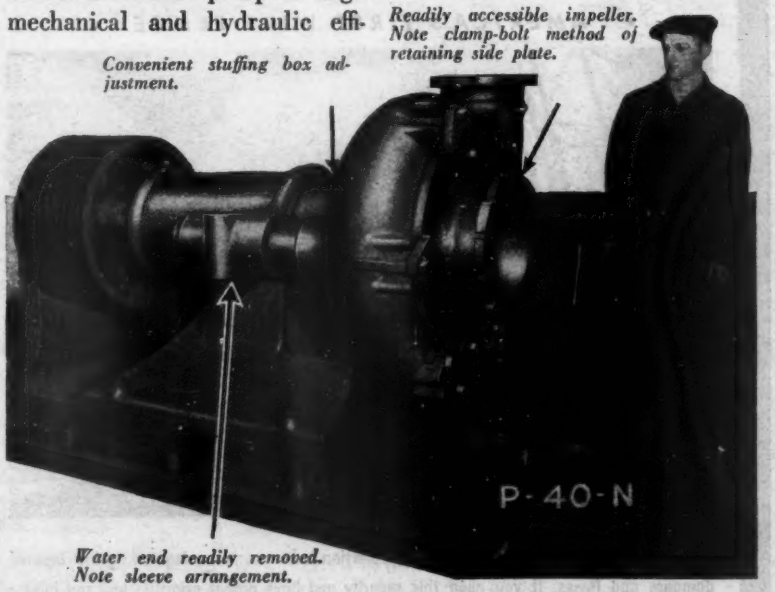
The stuffing box is opened by simply removing the cover cap when adjustment or repacking is needed. Slippage seal adjustment is easily made. The method of mounting the water end on the base, using tube supports, maintains accurate alignment and permits removal of the water end by loosening two bolts. The plate is easily removed by loosening clamp bolts. The impeller screws off.

Amsco-Nagle pumps are made in two horizontal and four vertical types, and in sizes from ¾" to 16", for heads up to 200' and capacities up to 10,000 g.p.m.

Ask for Bulletin No. 940.

Readily accessible impeller. Note clamp-bolt method of retaining side plate.

Convenient stuffing box adjustment.



Water end readily removed. Note sleeve arrangement.

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tion in NW NW NW 30-12n-101w, in the Haymower dome, Moffat County, Colorado, and is waiting for rig. The structure lies 6 miles west of the West Hiawatha field and the Wasatch horizons will be tested to the sands producing oil and gas at Hiawatha. The unit, which has been approved by the Secretary of the Interior, comprises 5,220 acres.

COLORADO WILDCAT COMPLETIONS

Webster Hill, Garfield County: Wasatch Oil Refining Co. 1 Clough, C NW SE 22-6s-94w, TD 3,600 ft., abandoned in Wasatch formation, several shows of gas, will leave hole in condition for deep test.

N. CENTRAL TEXAS

New Pool Indicated In Cooke County

WICHITA FALLS.—A new pool has probably been found in southwestern Cooke County at Kadane and Blanton 1 Hopkins, in the northwest corner of Section 17, BBB&CRR Survey A-150. It had a substantial showing of gas and oil on a drill-stem test of sand at approximately 2,980-92 ft., and prepared to set casing to complete. It is about ¾ mile south of Paul B. Scott et al 1 Walterscheid, recently completed as a good pumper from sand at 2,600-10 ft.

Montague County.—Continental Oil Co. 1 J. R. McNutt, wildcat 2 miles southwest of Bowie in the Burnett Survey, showed gas in 15 minutes, recovered 300 ft. of oil and 30 ft. of salt water on a 30-minute test at 6,744-55 ft., probably in the Viola lime. It drilled ahead, topping dolomite at 6,883 ft. and was preparing to make a drill-stem test of sand showing oil at 7,003-14 ft.

Clay County.—D. D. Feldman 1 H. D. Stine, in Section 25, Block 4, H&TCRR Survey, Ringgold field, topped the Caddo lime at 5,578 ft., flowed oil on a drill-stem test of saturated lime at 5,604-28 ft., total depth, and set pipe to complete.

NORTH TEXAS WILDCAT COMPLETIONS

Archer County: Sohio Oil Co. 1 A. D. Britton, W. Hensley Sur., 2 mi. S and 1½ mi. W Holliday, elev. 1,046 ft., dry, TD 4,917 ft.

Knox County: C. W. and Wm. L. Snoddy 1 A. L. Haskins, Sec. 216, Blk. A, BBB&C Sur., 2 mi. E and 1 mi. N Hefner, dry, TD 1,806 ft.

Wilbarger County: J. E. Gray 1 Donnie Wheeler, Sec. 56, Blk. 4, H&TC Sur., 7 mi. S Oklaunion, elev. 1,186 ft., pumped 5 bbl. day, TD 1,282 ft.

WEST CENTRAL TEXAS WILDCAT COMPLETIONS

Jones County: Hunt Oil Co. 1 T. J. Amason, S. Jones Sur. 266, 3½ mi. NE Noodle, elev. 1,774 ft., Dotham lime 2,185 ft., Noodle Creek 2,275 ft., Bend lime 4,455 ft., dry, TD 4,470 ft.

Stephens County: Orion A. Daniel et al 1 G. G. Harrison, T&NO Sur., 9 mi. NW Breckenridge, elev. 1,181 ft., Caddo lime and slight show oil 3,335 ft., dry, TD 3,378 ft.

Taylor County: Drilling & Exploration Co. 1 J. S. Hutson, Subd. 12, Grimes CSL, 1½ mi. SE Merkel, elev. 1,848 ft., Reef lime 3,095 ft., dry, TD 4,232 ft.

KANSAS

Wildcat Discoveries Pick Up as New Pools Loom

AFTER several lean weeks, during which wildcat results were consistently disappointing, Kansas operators now have three new tests which look like sure pool openers and a possible fourth.

Barber County.—Gulf Oil Corp. 1 Good, SE SE SE 28-30-12w, northeast of Lake City pool, may yet make a well, as swabbing tests showed a fluid with 70 per cent oil content, from Arbuckle pay at 4,439-42 ft.

Ellis County.—Sunray Oil Corp. apparently was opening a new Reagan sand pool 9 miles west of Hays, as its 1 Orth, NE NE SW 2-4-20w, filled up with 2,700 ft. of oil in 4 hours from Reagan sand at 3,846 ft.

Pratt County.—Skelly Oil Co. 1 Shriver, 3 miles southwest of Coats, in NE NE NE 33-29-14w, topped the Simpson at 4,551 ft., and produced 200 bbl. of clean oil. Other formations will be tested before final completion.

Sedgwick County.—Wentworth, Holl & Braine 1 Sautter, SE NE NE 22-29-2w, a Lansing test ¾ mile northwest of Clearwater, made 108 bbl. of oil and 33 bbl. of water in 12 hours from Lansing at 3,011-16 ft., after a 500-gal. acid treatment. The well is still testing.

KANSAS WILDCAT COMPLETIONS

Butler County: Bennett & Abels 1 Whiteside, W½ NE 20-25s-4e, dry, TD 2,752 ft., Mississippi lime 2,541 ft., Viola 2,722 ft.

Ellis County: Bridgeport 1 Morkey "C," SE SE SE 17-14s-20w, dry, TD 3,890 ft., Arbuckle 3,816 ft.

Graham County: Texas 1 Voss, SW SW SW 9-6s-21w, dry, TD 3,832 ft., Arbuckle 3,794 ft.

Harvey County: Wolf Creek et al 1 Schrag, NW NW SW 5-22s-2w, dry, TD 3,802 ft., Arbuckle 3,774 ft.

Osborne County: Harber Drilling 1 Union Central Life Insurance, SE SE SE 15-

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6s-15w, dry, TD 4,180 ft., Arbuckle 4,155 ft.

Ottawa County: Phillips 1 Kather, SW SW SW 15-11s-1w, dry, TD 3,630 ft., Arbuckle 3,580 ft.

Pratt County: Transwestern 1 Strait, SE NE SW 28-26s-13w, dry, TD 4,446 ft., Arbuckle 4,412 ft.

Rawlins County: Sinclair Prairie 1 Robbins, SW SW NE 32-4s-35w, dry, TD 5,219 ft., elev. 3,142 ft.

Sedgwick County: Adair & Morton 1 Mattson, SW SW NW 7-26s-2e, dry, TD 3,075 ft., Mississippi lime 3,039 ft.

Sumner County: Continental et al 1 Proud, NW NW NW 10-31s-1w, dry, TD 4,158 ft., Arbuckle 4,136 ft.

OHIO, KENTUCKY

Second Harmon Discovery Offset Gas Producer

COLUMBUS.—The second offset to Harmon's discovery well in the northeastern part of Huntington Township, Lorain County, came in at 12,000,000 cu. ft. with 1,225 lb. pressure in 10 minutes. The well, Ohio Fuel Gas Co. 1 Mary H. Parker, Tract 17, found the Clinton at 2,449-62 ft. Locations to the south and east will be drilled.

Robinson et al extended the Lake Township, Ashland County, pool a mile to the west. Located in NW Section 17 on Beulah Snyder, the completion logged sand at 2,928-33 ft. with 33,000 cu. ft., at 2,939-49 ft., 396,000 cu. ft. and at 2,955-64 ft. a show of oil. After shot the well shut in at 1,040,000 cu. ft. and an estimated 1 bbl. per hour.

Ohio Fuel completed its offset to Edson & Son's discovery in southwest Chatham Township, Medina County, with a gage of 1,000,000 cu. ft. natural. Sand in the well, Etta M. Shaw, Lot 3, was found at 2,644-50 ft.

H. B. Perkins completed a 60-bbl. producer on Lulu Cullison, Lot 8, Butler Township, Knox County. Production is from the second Clinton at 2,903-22 ft.

OHIO WILDCAT COMPLETIONS

Geuaga County, Newbury Township: Northern Ordnance 1 E. Y. Coppage, Lot 9, Oriskany, 2,550 ft., 145,000 cu. ft., show oil, Clinton, 3,833-42 ft., dry, Clinton, 3,857-68 ft., dry, Clinton, 3,912-88 ft., 60,000 cu. ft., shot and blew down to 48,000 cu. ft., dry, TD 4,000 ft.

Knox County, Liberty Township: W. Davidson 1 E. T. Lybarger, Lot 10, Clinton 2,231-51, dry, TD 2,302 ft.

Monroe County, Malaga Township: Barnesville Development Co. 1 A. C. Peters, Sec. 27, Warren, no sand, dry, TD 3,037 ft.

WILDCAT COMPLETIONS AND DISCOVERIES

	Week ended September 9, 1944					Cumulative total, 1944				
	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Ohio	0	0	0	3	3	1	0	12	49	62
Indiana	0	0	0	0	0	3	0	0	18	21
Illinois	0	0	0	1	1	23	0	0	216	239
Kentucky	1	0	0	4	5	13	0	0	61	74
Michigan	1	0	0	0	1	10	0	2	170	182
Kansas	0	0	0	10	10	37	0	6	300	343
Nebraska-Missouri-Iowa	0	0	0	0	0	1	0	0	9	10
Oklahoma	4	0	0	5	9	45	0	49	184	248
Texas:										
North Central	1	0	0	5	6	48	0	1	215	264
West	3	0	0	1	4	29	0	3	118	150
Panhandle	0	0	0	0	0	0	0	1	8	9
Eastern	0	0	0	4	4	5	0	1	88	94
Gulf Coast	1	0	0	9	10	27	9	13	166	215
Southwest	0	0	0	2	2	16	4	14	163	199
Total Texas	5	0	0	21	26	127	13	33	758	931
Louisiana:										
Northern	0	0	0	2	2	3	0	1	40	44
Southern	1	0	0	1	2	6	6	0	37	49
Total Louisiana	1	0	0	3	4	9	6	1	77	93
Arkansas	0	0	0	0	0	2	1	0	43	46
Mississippi	1	0	0	3	4	3	0	0	49	52
Alabama-Georgia-Florida	0	0	0	3	3	2	0	0	17	19
Montana	0	0	0	0	0	3	0	2	28	33
Wyoming	0	0	0	0	0	12	0	1	14	27
Colorado-Utah	0	0	0	1	1	2	0	1	23	26
New Mexico	0	0	0	2	2	4	0	3	41	48
California	0	0	1	1	2	4	0	7	139	150
Total United States	13	0	1	57	71	301	20	87	2,186	2,604
Total previous week	16	0	5	61	82					

WESTERN KENTUCKY

OWENSBORO, Ky.—A new pool was opened during the week in review 7 miles southwest of Henderson by the National Associated Petroleum Corp., the discovery well starting off at 135 bbl. of oil and some salt water, from Cypress sand. Fifteen wells were completed during the week, 7 of which were oil producers.

WESTERN KENTUCKY WILDCAT COMPLETIONS

Henderson County: National Associated 1

(Continued on page 139)

ILLINOIS

Stokes Pool in White County Yields a 2,000-Bbl. Well

CENTRALIA, Ill.—One of the largest initial producers of the year in Illinois was completed in the past week by Rock Island Refining Co. in its 2-A James H. Porter, SE NW NW 18-6s-9e, Stokes pool, White County, which started flowing 2,000 bbl. per day, naturally, from Levias lime at 2,973-77 ft., total depth 2,984 ft.

Phillips Petroleum Co. also completed a bigger-than-average well in 4 W. R. Tuley, NE SE NE 21-6s-10e, in the Concord pool, White County, which flowed an estimated 800 bbl. per day from Aux Vases sand at 2,961-74 ft., total depth 2,984 ft.

Only 31 wells were completed in the state during the week, 21 oil wells and 10 dry holes.

Seven new pools opened in Illinois in August were given names by the Illinois Geological Survey: Thackeray in Hamilton County; New Haven West in Gallatin County; Roaches North and Boyd in Jefferson County; Sumner in Lawrence County; Calhoun in Richland County, and Sailor Springs East in Clay County. These seven pools represent a new high record of discoveries for a month in 1944. Production fell off about 2,000 bbl. per day in August as compared with July output.

ILLINOIS WILDCAT COMPLETION

Marion County: Skelly Oil 1 Wilson, SE SE NW 36-1n-4w, dry at 2,960 ft. Lower Glen Dean 2,263 ft., Barlow 2,450 ft., Renault 2,705 ft.

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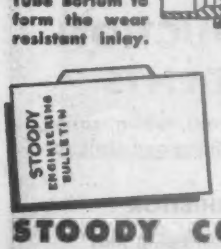

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Among the

Drilling Contractors

Major Oil Drillers, of Calgary, Alta., has received contract from Wesreserve Oil Co., of Toronto to drill No. 1 in LSD 7, 28-52-3w4, on Milburn Creek, on the north end of the Sarcee Indian Reserve near Calgary. It is a turnkey job.

Glen Boller, drilling contractor of Calgary, Alta., will be associated with operations in 1 Phillips Petroleum Co., 22-18-5w5, on the Sullivan Creek structure south and west of Turner Valley. Standard tools will be used for a test of both Madison and Devonian limestones.

Newell & Chandler of Calgary are completing drilling of Universay 3, LSD 12, 7-9-17w4, in the Taber field, southern Alberta.

R. & G. Drilling Co. has been organized by Clarence Raley and O. D. Gaiser and will maintain offices in Bakersfield, Calif. The new company's first drilling contract is a well in the Elk Hills field where Standard Oil Co. of California is developing undrilled land of the Navy Department. Standard has made a policy of developing this land by awarding drilling contracts to independent drilling contractors. R. & G. Drilling Co. has made commitments for several additional wells at Elk Hills and will be busy in that field for the next several months.

T. & T. Drilling Co., with offices at Whittier, Calif., has been awarded contract to drill 4-C of Severns Oil Co. in the East Coyote field and will move in rotary drilling equipment in the near future.

Helmerich & Payne, Inc., is the drilling contractor on the O. G. Harp et al 1 Mattheson, in NE NW NE 19-10n-2w, Cleveland County, Oklahoma, which was completing derrick for a deep test.

Markham Drilling Co. is the contractor on the Magnolia Petroleum Co. 1 Noah-Williams, in C SW SE 6-6s-3w, Love County, Oklahoma, near Orr. Contractor was reported to be moving in.

Apex Drilling Co. has the contract for a 4,800-ft. test which Frank Buttram is drilling in Garvin County, Oklahoma. The test is the 1 Cloud, in SE SE SW 1-4n-1w, about 2 miles west of Paoli, and was drilling below 2,900 ft.

Noble Drilling Co. has the drilling contract on the Pure Oil Co. 1 Rose, in SE NE SW 26-5n-8eCm, north of Keyes in northeastern Cimarron County, in the Oklahoma Panhandle. It is to be a test for the Arbuckle. Derrick was building.

Ptak Petroleum Co. has the drilling contract on the Fox & Fox 1 Tontz, in NE NE 32-17n-3w, Grady County, Oklahoma, east of the Crescent field. Location has been staked.

Daniels Drilling Co. has been awarded the contract to drill the Cities Service Oil Co. 5 Jones Community, in SW SW SW 1-11n-3w, Oklahoma County, Oklahoma. It is to be a test to the Pawhuska zone.

Comet Drilling Co., recently organized at Tyler, Tex., has opened a West Texas office at Midland, in the Noves Building. The company has two rigs running in the West Texas area. R. C. Johnson heads the company.

Carl B. King Drilling Co. has recently moved its Midland, Tex., offices from the Petroleum Building to the Eastham Building.

J. W. Carter, drilling contractor of Grand Prairie, Tex., has entered the Illinois basin with headquarters at Evansville, Ind.

Danciger Oil & Refineries has received contract from California Co. to recondition hole, set casing and test the Massive sand of the Tuscaloosa, in the 1 Tensas Delta Monaghan Land Co., wildcat in C SW SW 12-9n-7e, Catahoula Parish, Louisiana, 7 miles east of Harrisonburg, old well drilled to 9,215 ft. total depth and abandoned by Continental Oil Co.

Ajax Drilling Co. is to drill the C. L. Maguire, Inc., 1 Mable V. Wright, in NW NW NE 5-8n-5w, Ionia County, Michigan.

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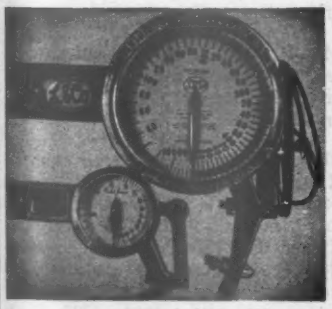

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Oklahoma City, Oklahoma

MISSISSIPPI

Natchez Pool Second Test Gets Condensate Flow

JACKSON.—The Pure Oil Co. 2 McDowell, 1,900 ft. NE of SW line and 2,275 ft. E of W line 12-6n-3w, second test in the Natchez pool of Adams County, had top of Massive sand at 10,264 ft., and made a test which showed a flow of gas estimated at rate of 3,000,000 cu. ft. per day with condensate at estimated 40 bbl. per day. A string of 7-in. casing was set at 10,290 ft., plug drilled out and hole cored to 10,293 ft., packer set and test made with ¼-in. bottom and ⅛-in. top chokes, flowing pressure reported 3,100 lb. Further coring is reported planned.

MISSISSIPPI WILDCAT COMPLETIONS

Copiah County: Amerada 1 Barlow, SE NW NW 2-10n-5e, dry, TD 10,218 ft., Massive sand 10,032 ft., Lower Cretaceous 10,163 ft.

Jasper County: Southland 1 Maske, SW NW 14-3n-12e, dry, TD 6,165 ft., Massive sand 6,053 ft.

Lincoln County: California 1 Douglas, approx. NE SE 10-6n-8e, flowed 374 bbl. oil through 5/32-in. tubing choke from pay zone 10,522-58 ft., TD 10,652, Marine Tuscaloosa 10,125 ft., Massive sand 10,522 ft., Lower Cretaceous 10,558 ft.

Madison County: Carter 1 Castens, SW NE 13-11n-3e, dry, TD 5,258 ft., Selma 4,052 ft., Eutaw 5,025 ft.

NORTH LOUISIANA WILDCAT COMPLETIONS

Sabine Parish: Lyons & Prentiss et al 2 4-L Co., SW NE SE 23-6n-13w, TD 3,638 ft., dry.

West Carroll Parish: Pure Oil 1 Costello, SE NW NE 27-23n-10e, dry, TD 5,501 ft.

ALABAMA WILDCAT COMPLETIONS

Lamar County: Stanolind 1-A Woods, approx. NE SE 23-14s-15w, dry, TD 3,170 ft., Tuscumbia 3,061 ft., Fort Payne 3,144 ft.

Kentucky Fields

(Continued from page 137)

Maude Rudy, SW SE SE 4-0-23, 6 mi. S of Henderson, Cypress sand 2,246-51 ft., TD, 136 bbl. oil, 22 bbl. salt water in 24 hours. A pool opener.

Daviess County: Miller & Shiarella and Ashland 1 A. L. Goins, NW SW SW 21-0-27, dry at 1,988 ft. Lower Menard 1,295 ft., Barlow 1,683 ft., Ste. Genevieve 1,866 ft.

J. C. Ellis 1 George Donevan et al, C NE SE 19-Q-27, dry at 1,884 ft., Vienna 1,148 ft., Glen Dean 1,360 ft., Paint Creek 1,562 ft., Ste. Genevieve 1,683 ft.

Webster County: Ohio Oil 1 F. M. Baker, 3-M-23, 7 mi. SW of Sebree, dry at 2,075 ft. Kincaid 903 ft., Barlow 1,604 ft., Ste. Genevieve 1,785 ft.

EASTERN KENTUCKY OPERATIONS

ASHLAND.—South Penn Oil Co. completed 17 Pleas Tipton on Miller's Creek for 5 bbl. daily.

The West Virginia Gas Co. completed 753 Hiram Gibson on Caney Fork in Knott County, at 3,000 ft. in shale with daily open flow of 403,000 cu. ft. of gas.

Kentucky West Virgfinia 756 J. S. Cline, Pike County, was dry at 4,114 ft.

INDIANA

EVANSVILLE, Ind.—Five wells were reported completed in Indiana in the past week, only one of which was a producer, a 12-bbl. well in Gibson County. A hopeless fishing job caused the abandonment of one test on the Bozeman land in 26-3s-14w, Gibson County.

Here lies the body
Of Jim McQuirk.
He hung up his line
And lost his shirt

Brodie would never have used a Baker Rotary CASING Scraper—he would have taken a chance like our friend Jim, bless his soul. Jim figured the inside of the casing was clean—no scale, no burrs from gun-shot holes, no hardened cement. There's a new driller on the rig now and also a Baker Rotary CASING Scraper. This is one of the sweetest, simplest, most business-like tools you ever saw . . . turn to Page 357 of the 1944 Composite (or Baker) Catalog and look it over—or write us for a swell portrait of it.

(Just in case you might want to use one of 'em look on Page 302.)

BAKER
ROTARY CASING SCRAPER
BAKER OIL TOOLS, INC.

STOP PAYING TRIBUTE TO LEAKS

RECTORSEAL, the outstanding leak preventer, positively seals all connections. It's easy to apply. Just brush or swab it on the threads when making up connections.

Use RECTORSEAL on casing and tubing collar threads; drilling rig connections (mud, water and steam lines); separator and flow line connections; setting bolted steel tanks; Natural Gasoline Plants and Refineries (gasoline, steam and acid lines); engine and compressor gaskets; Gas and Water Distribution Systems.

Order RECTORSEAL from your supply store. Available in Gallons, Half-gallons, Quarts, Pints and Half-pints.

RECTOR WELL EQUIPMENT COMPANY, INC.
Fort Worth, Texas
Export: Lacey Export Corp., Woolworth Bldg., N.Y.C.

RECTORSEAL
THE POSITIVE LEAK PREVENTER

PERSONALS

His Birthplace Was Target of Allied Bombings

ROBERT J. SULLIVAN, new acting superintendent of The Carter Oil Co.'s eastern division, watched with interest the vicissitudes of Ploesti, Romania, long in German hands and target of Allied bombings. He was born there, and his father was a pioneer in the development of the Ploesti oil area. The boy lived there and at Negritos, Peru, until he was of school age, when the family returned to the United States.

Young Sullivan received his A.B. at Notre Dame University in 1931 and his B.S. in petroleum engineering at University of Oklahoma 2 years later. He has been in Carter service ever since. He was appointed division engineer and acting geologist when the company assumed operation of the South Burbank maintenance project in 1935. He remained there till 1937. After spending a year as petroleum engineer in the company's general offices in Tulsa, he was assigned to the eastern division headquarters in Mattoon, Ill., as division engineer, the company having become active in the Illinois basin. The division comprises the company's holdings in Illinois, Indiana, Kentucky and Michigan. Sullivan was appointed assistant division superintendent in December 1942 and held that post until his recent promotion.

Sullivan is national vice chairman of American Petroleum Institute's topical committee on production practice and active in other phases of A.P.I. work. He is chairman of District 2 well-spacing committee.

Dr. Gustav Egloff, director of research for Universal Oil Products Co., has been elected a director of Chicago Technical Societies Council, which represents 40 scientific and technical organizations in the Chicago area, with a membership of 15,000. He also has been elected a trustee of Western Society of Engineers.

R. D. Moriarty, in the foreign materials section of Standard Oil Co. of New Jersey, will be located in Caracas, Venezuela, starting about September 15, as coordinator of materials for Creole Petroleum Corp. He spent 14 years in Venezuela for Standard of New Jersey interests, returning to the New York office in 1937.

Lt. Donald H. Brown, in the engineering department of Lone Star Gas Co., Dallas, before entering war service, was reported recently to be in a hospital in England, recovering from wounds suffered in the Cherbourg invasion.

Capt. Andrew C. Elliott, formerly a field geologist for Shell Oil Co., Inc., was transferred from the infantry to the engineering section after arriving in England and is now engaged in the job of building roads and bridges in France.

James P. McCullough, engineer in the general-office engineering department of United Gas Pipe Line Co., Shreveport, has been made assistant department head of the contracts and right-of-way department.

Robert E. Hardwicke, Fort Worth oil attorney, has been appointed chief counsel for Petroleum Administration for War, succeeding **J. Howard Marshall,** who resigned to resume his law practice in San Francisco. He is a member of the partnership Hardwicke & Cheek and has been associate counsel for PAW during the past year.

Francis H. Smith, who was manager of Standard Oil Co. of California's Richmond refinery, has been appointed assistant manager of the company's manufacturing department. The new Richmond manager is **Richard K. Rowell,** who was manager of El Segundo plant. Rowell is succeeded by **W. W. Davison.** Taking over Davison's work as assistant manager at El Segundo is **E. E. Lyder. O. N. Miller** succeeds Lyder as superintendent of the cracking division at El Segundo. Smith became Richmond refinery manager in 1934.

W. A. Johnston, chief chemist of Bradford Penn Refining Corp., Clarendon, Pa., has been chosen chairman of the technical advisory committee of Pennsylvania Grade Crude Oil Association, succeeding **Frank J. Philippbar,** Bradford, who resigned. **G. M. Kirkwood,** plant manager for Pennsylvania Refining Co., Karns City, was elected vice chairman.

Harry H. Power has returned to the Department of Petroleum Engineering, University of Texas, after a summer's work in the production research department of Humble Oil & Refining Co., Houston.

William Bates, who was division field engineer for Shell Oil Co., Inc., at the Los Angeles headquarters, has been appointed drilling engineer. **Vincent Finch,** a geologist at Shell's Bakersfield office, has been appointed district geologist, with headquarters at Bakersfield.

E. F. Miller, chief geologist for A. G. Oliphant, independent operator of San Antonio, has been transferred to Tulsa.

Dr. J. B. Rather has been appointed a member of the manufacturing committee of Socony-Vacuum Oil Co., Inc., and will be its technical adviser. Dr. Rather has been manager of the general laboratories and chairman of the company's refinery process committee since 1932. He is also vice president and a director of Neches Butane Products Co. **William M. Holaday,** who has been on leave to Petroleum Administration for War, has returned to Socony-Vacuum to succeed Dr. Rather as manager of the general laboratories. Holaday was assistant director of refining for PAW.

Charles H. Lind, for several years in civil engineering work in Houston, has joined the scouting staff of Humble Oil & Refining Co. in Midland, Tex. He takes the place of **J. D. Hatch, Jr.,** who was transferred to the geological department

Industrial Items

Tractor Links on Tractors Repaired by New Welding Method

The track link or rail on track-laying tractors receives a great amount of wear due to abrasive materials from the terrain falling into the working parts of the track. To maintain maximum traction efficiency, frequent replacements of these moving parts becomes necessary as they become worn. Through the development of special steels for welding, by Allied Steel Products, Inc., N.B.C. Bldg., Cleveland, repair and replacement costs and "lay-up time" are reduced to a minimum. The link castings can now be salvaged by welding on to the rail surface, a special steel plate, which builds up the worn surface, restoring the original worn casting to its original weight and thickness. These plates are fabricated to correct sizes to fit the track link casting and are affixed by gas or electric welding.

Jones & Laughlin Supply Co. Announce Personnel Changes

With the recent acquisition by Jones & Laughlin Supply Co. of all stores and inventory of Atlas Supply Co., a consolidation of stocks and personnel was necessary. These changes have resulted in a regrouping of some districts.

Northern Oklahoma district now includes the Cushing store with H. L. Ottinger, store manager. A. A. Hopper, district sales manager, continues in charge with headquarters at Bartlesville.

Central and Southern Oklahoma district, under district sales manager L. R. Roberts, will include the Duncan and Healdton stores, B. R. Bourland and R. C. Trewhitt being store managers. Oklahoma City store is under store manager William H. Whatley, with R. M. Estes, formerly of Atlas, as assistant store manager. H. D. Strong and R. C. Shaw will serve this area in a sales capacity.

Kansas district will have headquarters in Wichita, under district sales manager C. E. Robertson, with R. B. Yanaway as assistant, both men being formerly with Atlas. At Russell, Kans., the store is under R. P. Watson as manager and R. D. Goodnight, salesman, Watson being a former Atlas man. Former Atlas stores at Bushton and McPherson, Kans., are under the same store managers, W. P. Knowles and DeLoss Parr.

Rocky Mountain district, under district sales manager M. A. Park, is a newly created district with offices at Cody and Casper, Wyo. The Powell, Wyo., store is under store manager Paul Stunkard with W. H. Sidell as salesman.

West Texas district, under district sales manager C. W. Moore, has been enlarged to include the former Atlas store at Artesia, N. M., under former store manager A. B. Sloan with T. Shirley Hager continuing as salesman. Store at Kermit, Tex., has been consolidated in Jones & Laughlin Supply Store, under store manager R. L. Daniels with H. H. Ray as salesman. Assisting Moore will be G. E. Mershon, located at Midland, Texas.

Louisiana-Arkansas-East Texas district has been enlarged. A. G. Bastian continues as district sales manager with J. A. Evans, Jr., who returns after a 2-year assignment with the engineering and construction division, as assistant district sales manager. Former Atlas stores at Gladewater and Overton, Tex., are continued under store managers R. D. Dickinson and J. K. Weller, respectively. E. C. Bynum continues as salesman at Overton.

Illinois-Kentucky district, under U. G. White, Jr., district sales manager, now includes the former Atlas store at Grayville, where R. L. Gibbons continues as store manager. The new store at Henderson, Ky., is under R. G. Wallace. At Salem former Atlas store stocks have been consolidated in the Jones & Laughlin Supply Store under A. H. Crenshaw.

Pennsylvania-Ohio-West Virginia-Southern New York district will include the recently opened store at Canton, Ohio, with Forrest McAdams as store manager, and H. C. Goodwin as salesman. To this district under district sales manager H. E. Wagner, Pittsburgh, has been added A. M. Schillinger and William Ferguson.

At Tulsa, the sales force has been augmented by two former Atlas men, R. E. Howe, being moved from Muskogee, as assistant to the sales manager, and J. A. Fretwell continuing in Tulsa as salesman. W. O. Hardy was moved from Pratt, Kans., who with F. A. Street, has joined forces with Tom Haney on general sales. Fred W. Hammett continues on refinery maintenance sales. H. U. Everett has moved from Muskogee to Tulsa as assistant credit manager.

A. J. Edwards Joins M. F. Hampton & Co.

M. F. Hampton & Co., pipe-line and oil-field equipment sales company, Tulsa, announces the entrance of Allen J. Edwards into the firm as a copartner. Edwards served for 18 years with Black, Sivalls & Bryson, 12 of which were as sales manager.

The new firm will specialize in pumps, engines, half soles, welding sleeves, river-crossing clamps and other pipe-line equipment.

Blanchard Joins Tyson As Chief Metallurgist

Edwin U. Blanchard has joined Tyson Bearing Corp., Massillon, Ohio, as chief metallurgist. For the past 13 years Blanchard occupied a similar position with Bower Roller Bearing Co., Detroit, and is a member of the Roller Bearing Engineers Committee of the Anti-Friction Bearing Association.

Named Marsh Export Manager

The Jas. P. Marsh Corp. of Chicago recently announced the appointment of R. S. Gaisford as manager of the Marsh export department located at 155 E. 44th St., New York City.

Eagle-Picher Announces New Appointments

T. C. Carter, vice president of Eagle-Picher Sales Co., and general manager of its insulation division, has announced that Douglas Via has been promoted to industrial insulation sales manager. Andrew L. Harris has left the National Association of Manufacturers, as an executive in public relations work, to accept Eagle-Picher's appointment as manager of sales promotion.

Hyster Shifts Two Executives

Donald Foster, Portland, Ore., is the new Chicago branch manager of Hyster Co., with offices in the LaSalle Wacker Building, 221 North LaSalle Street. C. C. Dunham, former Chicago manager, will go to the company's Portland factory as personnel manager.

Fairbanks, Morse & Co. Buys Pomona Pump Firm

Fairbanks, Morse & Co. has purchased Pomona Pump Co., a division of Joshua Hendy Iron Works in a $4,000,000 transaction.

All physical assets, patents and trademarks of the Pomona and Westco pump lines were included in the transaction. The Pomona firm has plants in Pomona, Calif., and St. Louis.

No changes in personnel are contemplated and, according to Morse, Arnold G. Brown, general sales manager of the Pomona company, becomes assistant manager of the Fairbanks-Morse Pump Division in charge of Pomona and Westco products. Distribution and sales will continue under Brown's direction.

Hereafter the Pomona pumps will be known as Fairbanks-Morse-Pomona, and Fairbanks-Morse-Westco line.

Badger Moves Philadelphia Office

E. B. Badger & Sons Co., 1608 Walnut Street, Philadelphia 3, announces the removal of its Philadelphia office to the northeast corner of Broad and Arch streets, Philadelphia 7.

New York Nomads Hold Outing

The annual golf outing of the New York chapter of Nomads was held at Bonnie Briar Country Club, Larchmont, N. Y., July 25. Approximately 65 members and guests were in attendance. I. Frank Brown won the golf tournament for the fourth consecutive year by shooting a low gross of 79.

Trade Literature

The S. M. Jones Co., Toledo.—A 28-page booklet entitled "Care and Handling of Sucker Rods." The booklet is a revised and reprinted version of a previous volume. It thoroughly covers the subject, from unloading and warehousing, to dimensions and weights.

Victor Equipment Co., 844 Folsom St., San Francisco.—A bulletin illustrating the design and construction features of certain types of single and two-stage reduction regulators employed in the welding industry.

W. H. and L. D. Betz, Gillingham and Worth Streets, Philadelphia.—A 44-page booklet, profusely illustrated, presenting the various chemicals which are used for industrial water analyses for plant control. The book features the test sets required for such determinations as hardness, alkalinity, phosphate, sulfate, dissolved oxygen, pH value, silica, and others.

Key Co., East St. Louis, Ill.—Bulletins Nos. 344 and 544. The former is a report on high-temperature tensile properties of five cast steels, and the latter, entitled "Installation and Maintenance Tools," covers tools for installation and servicing of fittings for oil-still heaters.

National Carbon Co., Inc., Carbon Sales Division, 30 E. 42nd. St., New York.—New catalog section M-8802, "Karbate Corrosion-Resistant Heat Exchange Equipment," which sets forth several charts and tables on heat conductivity and properties of carbon, graphite and Karbate materials.

Four California Refiners Buy Navy's Part of Elk Hills Crude

WASHINGTON. — Contracts were approved late last week for the sale of approximately 2,500,000 bbl. of Elk Hills crude to four West Coast refiners. The oil represents the Navy's share of the total production from Elk Hills Naval Petroleum Reserve for the 6-month period ending December 31, 1944, and is the first crude to be produced from the reserve under the unit-plan contract signed June 19, 1944, by Navy and the Standard Oil Co. of California.

Purchasers were the Union Oil Co. of California, Shell Oil Co., Inc., General Petroleum Corp. of California, and the Mohawk Petroleum Corp. The four purchasers possess refining capacity, the Navy said, immediately available to supply the needed military naval products.

A second offering of crude oil from the Elk Hills field is expected to be made later this year. This will cover crude oil to be produced for Navy's account from the reserve during the 6 months beginning January 1, 1944.

The price paid by the four contractors for Elk Hills oil to be produced this fall is in accord with OPA ceiling prices for petroleum produced in private fields in the area. The Elk Hills reserve is in an OPA Group 2 pricing area where crude-oil ceilings are established on an A.P.I. gravity basis, ranging in this area from 11 to 31°. On this basis, prices on crude produced in the area range from 92 cents to $1.28 per barrel. Preliminary geological checks in the reserve place the recently sold oil in the range of 20 to 22° gravity, which will bring about 98 cents per barrel. Price adjustments will be made if the oil should exceed or fail to meet the expected gravity.

While the oil was sold to highest bidders, only bids in accordance with posted OPA market prices were considered, a Navy spokesman said.

Production from Elk Hills is expected to reach the 65,000 bbl. a day authorized by congressional resolution by June 30, 1945, Naval Petroleum Reserve officials say. Drilling is somewhat behind schedule now, but drillers are soon expected to complete an average of a well a day, reaching the planned 300 new wells, by next June 30, the date set by the Navy for completion of drilling.

Thirteen wells have been completed now in the east part of the reserve, adjacent to the developed sector. Fifteen drilling crews are engaged in the field, and 10 wells are drilling constantly, the other five crews moving and rigging up.

Drilling is being subcontracted by the Standard of California to 13 contractors, one of them having two rigs in the field.

Black-Oil Treating Plant Designed to Lower Sulfur

DENVER. — General Petroleum Corp. has completed and is ready to put into operation a 1,500-bbl. treating plant in the Garland field, Big Horn County, Wyoming, to handle black oil with high sulfur content.

The process is reported to have been developed in the company's laboratory in California and to involve new features for removing sulfur and converting the crude to the requirements of the ordinary type of fuel oil and cracking plants

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USED DRLG. EQUIPMENT & PIPE

1—Allis-Chalmers, model E, tubing and rod machine, completely overhauled—4 excellent tires.
2—14 x 7¼ x 18 Wilson-Snyder, high pressure slush pumps with side suction, mounted on steel skids.
4—12 x 12 Ideal steam drilling engines, piston type, excellent cond.
1—Ideal drawworks 7½", late style, jackshaft, completely roller bearing with Parkersburg Hydromatic brake, ready for service.
3—108 H.P. 300 W.P. Lucey boilers, State inspection certificates attached, complete with burners, stacks and all connections.
1—Ideal 300 Ton swivel, model C-S, excellent condition.
5—Emsco, 250 Ton swivels, model 14E, overhauled completely.
2—26" Wheland Oil bath rotaries, excellent condition.
1—27½" Ideal Oil bath rotary, model F.E.
2—Gardner-Denver power pumps, 7¼ x 14 oil bath roller bearing, excellent condition.
1—Gardner-Denver power pump, 6 x 12, enclosed, R.B., Jr. Booster model.

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5500 ft. 3½" full hole, Range II, Hughes streamline tool joints, seen very little service.
3500 ft. 3½" Range II Reg. drill pipe, Hughes tool joints, excellent condition.

DRILL COLLARS

7 *New* 2¾" O.D. x 20' Pre-war collars, ea. 15% off new price.

SUCKER RODS

300,000 ft. ¾" pin & box, A.P.I. sucker rods, excellent condition, loaded in cars, per ft. 5c.
200,000 ft. ¾" pull rods, excellent condition, loaded in cars, per ft. 2½c.

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No Priorities Needed

7,000 ft. New 7" O.D. 26#, Range II, T & C Casing.
15,000 ft. New 2⅜" Eue, Range II, T & C 6.60# Tubing.

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